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# WORLD SWORDFISH FISHERIES

Volume III.

**Asia**

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This volume should be cited as: Mark R. Wildman. Asia - Swordfish Fisheries. Published in: "World Swordfish Fisheries: An Analysis of Swordfish Fisheries, Market Trends, and Trade Patterns, Past-Present-Future. Volume III." Prepared by the Office of Science and Technology, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, Silver Spring, Maryland, 1997.

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# WORLD SWORDFISH FISHERIES

## An Analysis of Swordfish Fisheries, Market Trends, and Trade Patterns
*Past-Present-Future*

Volume III.

**Asia**

**Prepared by**
**The Office of Science and Technology**

Mark R. Wildman

**November 1997**
NOAA Tech. Memo. NMFS-F/SPO-25

**U.S. DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
**National Marine Fisheries Service**
**Silver Spring, Maryland**

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# NOTES

The authors have used statistical data collected by the International Commission for the Conservation of Atlantic Tunas (ICCAT) in Madrid and the Food and Agriculture Organization (FAO) of the United Nations in Rome as the primary sources for statistical data. Unfortunately, that data does not always match perfectly and some discrepancies exist. In addition, ICCAT and FAO data frequently do not agree with information supplied by various countries. The authors have, for example, press clippings showing landings of swordfish by countries whose landing statistics show "no landings" in both ICCAT and FAO catch statistics. The authors believe that these instances are rare, but they do suggest that readers allow for modest adjustments to figures cited in the report.

This survey depends heavily on unconfirmed press reports from many of the countries involved. The National Marine Fisheries Service (NMFS) does not certify the accuracy of these reports nor does their selection reflect the official view of the U.S. Government. The authors are aware of many missing documents which might have shed additional light on this subject. The authors encourage individuals or firms with additional information to write to the authors at the address provided in this report.

# ACKNOWLEDGMENTS

The author first wishes to thank Dr. William W. Fox, Jr., Ph.D., Director of the NMFS Office of Science and Technology and Mr. Frederick H. Beaudry, Chief, Division of International Science and Technology, who provided invaluable support for this project. Without their assistance, this report could not have been completed. Ms. Nina Loewinger of the NMFS Office of Science and Technology edited this document and provided helpful input.

Numerous colleagues reviewed this document and provided valuable input. The staff of the NMFS Southwest Fisheries Science Center, in particular Dr. Gary Sakagawa and staff in the Pelagic Fisheries Resources Division, provided comments which improved the accuracy of this document. Ms. Karyl Brewster-Geisz of the NMFS Office of Sustainable Fisheries, Division of Highly Migratory Species, thoroughly reviewed these reports and greatly improved their clarity. The NMFS International Fisheries Division (Ms. Kimberly Blankenbeker, Mr. Paul Niemeier, and Dr. Dean Swanson) provided insightful comments. Mr. Scott Smullen and Mr. Gordon Helm of the NOAA Office of Public Affairs provided many useful editorial suggestions. The author would also like to thank Mr. Will Martin, NOAA Deputy Assistant Secretary for International Affairs, and Mr. Brian Hallman, Deputy Director, Office of Marine Conservation, Department of State, for their timely review of this document.

The NMFS Office of Science and Technology conducts an active summer intern program to introduce high school and college students to the Federal Government. These students have played an important role in preparing tables and graphics, conducting internet and library searches, preparing bibliographies, and formatting the text for publication. The individuals involved in preparing the Asia Volume were Ms. Kasi Addison, Ms. Rita Anderson, Ms. Gina Beck, Ms. Jennifer Chang, and Ms. Christine Parker.

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# Overview

Large pelagic fish species, such as tuna and billfish, are caught by Pacific Rim fleets all over the world. These fisheries are conducted by both industrialized distant-water fishing fleets and smaller coastal and inshore domestic fishing fleets (referred to as artisanal fisheries in developing countries). The vast majority of billfish landed in distant-water fisheries are caught by the longlining fishing method. The major distant-water longliner fleets in the Asia-Pacific region are operated by Japan, Taiwan, and the Republic of Korea (ROK). For the most part, these fleets target tuna species and catch swordfish incidentally in their distant-water longliner fisheries. Overall swordfish landings by Pacific Rim distant-water longliner fleets have increased significantly since 1991, largely due to increased landings by the Taiwan fleet. The Philippines, Indonesia, and Sri Lanka possess coastal fleets which have recently recorded dramatic increases in swordfish catch.

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## I. Fleet

This study will focus on the distant-water and coastal fleets that catch the vast majority of billfish in the Asia-Pacific region: longline, drift- or gillnet, and harpoon.

### Longliner Fishing Overview

Japan, the Republic of Korea, and Taiwan are the major operators of Asian distant-water longline fleets which target high-value tuna species and incidentally catch billfish species, including swordfish. Modern tuna longlining was initially developed in Japan several hundred years ago as a relatively simple method to catch large yellowfin tuna and albacore.[1] This technique is preferred for harvesting tuna and billfish for the *sashimi* (raw tuna) market since it is relatively "clean" (meaning little damage is done to the fish carcass during harvesting).

Longline gear consists of a mainline that is set horizontally near the surface, to which branch lines are clipped at regular intervals, each with a single baited hook. One set of longline gear usually consists of thousands of hooks clipped to a single mainline, buoyed by plastic or glass floats. Longlines can extend over many kilometers and allow a single vessel to catch fish species which are not concentrated in a limited area. Longline bycatch of fish species includes dolphinfish (*Dorade tropicale)*, wahoo (*Thazard batard)*, barracuda (*Sphyraenidae)*, moonfish (*Vomer declivitrons)*, pomfrets (*Bramidae)*, and sharks. Non-fish bycatch in these fisheries includes sea turtles and sea birds.

A typical Asian distant-water longliner measures 150-300 gross registered tons (GRT) and 24-46 meters in length, with a crew of 15-30 persons. Fishing trips can range from several months to a year, with catch landed in East and Southeast Asian ports, or transhipped to freezer vessels in ports near main fishing grounds around the world. In addition, smaller longliners from these fleets (less than 100-GRT) are active in the central western Pacific. These vessels land their catch in Pacific Island countries such as Palau, the Republic of the Marshall Islands, and the Federated States of Micronesia, for air transshipment to the Japanese *sashimi* market.

A typical Asian longliner sets 80-100 kilometers (km) of mainline with 2,000 baited hooks each day. Catch rates

usually do not exceed one percent of the hooks set; for example, it would not be unusual for 10-13 albacore, 5-15 yellowfin and bigeye tuna, and a few billfish to be caught per 1,000 hooks. This fishery has remained economically viable thanks to the large number of hooks set, long trips, relatively low operating expenses, and high value of the catch. It should be noted, however, that increasing fuel and labor costs have narrowed profit margins for industrialized fleets and shifted effort to fleets in developing countries such as China.

Longliners set and retrieve their gear once each day, with the time of setting and hauling determined by the target species and prevailing fishing conditions. Typically, Asian longliners bait their hooks and set their gear before sunrise. The mainline is set while the vessel travels across the prevailing current at about 15 km/hour while the crew snaps baited branch lines, typically 18-27 meters (m) long which are attached to the mainline at approximately 46 m intervals. Longliners usually use sardine, scad, squid, or saury for bait, and a buoy is attached to the mainline about every 12 hooks. To set a mainline to catch deeper dwelling large tuna species (e.g. bigeye), more branch lines are attached between floats, longer buoy lines are employed, and a line shooter machine is employed to release the mainline at a speed faster than the boat is traveling, resulting in additional slack in the mainline during setting. The mainline is marked with flags, lighted buoys, and radio beacons.

After setting has been completed, the vessel may drift or travel slowly along the line, looking for bobbing floats which indicate struggling fish. If struggling fish are spotted, that section of line is retrieved and re-baited. Otherwise, the line may be left until noon, when the full-scale hauling procedure begins. The crew may retrieve line continuously for up to 12 hours. During retrieval, the vessel must be kept moving at a speed of 3-6 km/hour because the line is too heavy to retrieve from a stationary vessel. As the mainline is retrieved, the crew removes the branch lines, buoy lines, lights, and radio buoys, which are readied for the following day's set. The only break in this routine occurs when a hooked fish is landed or a tangle takes place in the line. Tangles must be removed immediately or cut away, since there is little time between the end of one day's haul and the next day's set. After all the line has been retrieved, damaged mainline sections are repaired, and gear and bait are readied for the following day's set. Hooked fish are killed quickly to minimize struggling that could damage the fish and reduce its market value. The catch is immediately bled, gilled, gutted, and chilled in ice brine. Stomach cavities are usually filled with ice, with the fish itself stored on ice or flash/blast frozen.

**Distant-water longliners**

**Japan:** Japanese distant-water tuna longliners first began operations in the Indian Ocean during 1952. This fleet caught approximately 40 percent of the entire catch posted by the Japanese tuna fleet in 1993. Longliners generally target bigeye, bluefin, and albacore tuna for the Japanese sashimi market. In the course of these tuna fishing operations, a significant amount of billfish (including swordfish) are caught incidentally. The number of Japanese tuna longliners has decreased gradually over the years, from 901 in 1985 to 743 in 1995 (appendix 1 in Japan chapter). Despite the reduced number of vessels, catch in this sector increased from just under 170,000 tons (t) in 1989 to over 205,000 t in 1993 (appendix 15 in Japan chapter). Figures for 1994, however, indicate that catch for this fleet decreased to 197,000 tons. Billfish and swordfish catches by the distant-water longliner fleet have been fairly constant during the same time frame, with swordfish totaling approximately 8,000-9,000 t each year (appendix 18 in Japan chapter).

**Taiwan:** The Taiwan distant-water longlining fleet (larger than 100 gross registered tons (GRT) increased during the 1980s, peaking at 841 vessels in 1990, but has decreased since then to 692 vessels in 1995 (appendix 1 in Taiwan chapter). Taiwan longliners fish in the Atlantic, Pacific, and Indian Oceans, with the majority of the catch consisting of albacore tuna, plus a significant amount of incidental billfish bycatch. Despite the reduced number of distant-water longliners, overall catch by this fleet increased remarkably from nearly 135,000 t in 1991 to an all-time high of 300,000 t in 1993 (appendix 8 in Taiwan chapter). Figures for 1994, however, showed a sharp decrease in overall distant-water longliner catch to just 209,000 tons. Recently released data for 1995 show that the catch recovered somewhat to 223,000 tons. Distant-water longliner swordfish catch, however, has risen sharply from 5,977 t in 1993 to 19,373 t in 1995(appendix 13 in Taiwan chapter).

**Republic of Korea (ROK):** The ROK tuna longliner fleet consists of longliners based at Pusan, and at foreign ports around the world. The domestic-based longliners target bigeye and yellowfin tuna for the Japanese *sashimi* market, while the foreign-based fleet focuses on albacore for canning. The most recent ROK Government data indicate there were 218 ROK distant-water tuna longliners in 1994, a significant decrease from the peak of 387 longliners in 1989 (appendix 1 in ROK chapter). Catch data mirror this

trend as distant-water tuna longlining reached 95,401 t in 1986 but decreased to 57,049 t in 1994 (appendix 7 in ROK chapter). Catch trends for billfish, which are caught incidentally in this fishery, are difficult to discern since the majority of billfish are classified as "other billfish" in ROK catch statistics. According to the FAO, ROK swordfish catch reached 1,248 t in 1980, but has ranged between 32 and 300 t during the 1990s, with most of the catch coming from the North Pacific (appendix 10 in ROK chapter).

**China:** China initiated distant-water tuna operations in the South Pacific in the late 1980s. The majority of these vessels were at that time 19-GRT class wooden longliners which operated in groups of five to ten. The Japanese fisheries press has estimated that 200 Chinese tuna vessels fished off Palau and Micronesia in 1993.[2]

More recent reports indicate, however, that Chinese longliners range in size from 70-90 GRT, possess 250-400 horsepower engines, are 28-30 m long, and operate with crews of 8-10 men. Most of the vessels belong to companies in the southern provinces of Guangxi, Guangdong, Fujian, and Zhejiang, but companies in the northern provinces of Liaoning, Shandong, and Jiangsu have also dispatched vessels to the South Pacific. China's tuna fishing fleet reportedly consists largely of used vessels from Taiwan and Japan on which tuna fishing gear has been installed, and existing vessels which have been refurbished for tuna fishing operations. At the present time, China is not building large fishing vessels.[3]

The Chinese tuna longliner fleet generally fishes from the end of April to November in South Pacific fisheries. Fishing vessels operate at sea for 7-10 days before returning to port. The fleet relies on local fish bases for supplies. China's largest tuna fleet is run by the China Ocean Fishery Company, a joint enterprise led by the China Marine Company with participating companies from Fujian, Beihai, Hainan, and Shandong. The company possesses a fleet of 200 vessels which operate off Palau, Micronesia, and the Marshall Islands.

Data collected by the South Pacific Commission indicates the number of Chinese longliners has risen from 31 in 1991 to 461 in 1994. Total catch, comprised largely of bigeye and yellowfin tuna, increased from 888 t in 1991 to over 14,000 t in 1994.[4]

Operating costs for these vessels are low compared to other Asian fleets which means that Chinese-caught tuna can be sold in Japanese markets at prices which China's developed Asian neighbors' (e.g. Japan, the ROK, Taiwan) tuna fleets can not match. Much of the capital for Chinese distant-water tuna fishing operations reportedly comes from Taiwan companies. Chinese tuna vessels at present do not have the deep-freezing technology of their more developed East Asian competitors, but Taiwan financial backing could pave the way for a Chinese ultra-low temperature freezer longliner fleet sometime in the future.[5] No information is available regarding billfish catch by these vessels.

**Coastal/Offshore Longlining**: Japan and Taiwan both register significant swordfish catches by these fleets. Most of the vessels are 20-50 GRT and target large tunas, with billfish (including swordfish) as a significant bycatch. Catch trends have fluctuated in recent years. More detailed information on these fleets is provided in the Japan and Taiwan chapters of this study.

**Longlining bycatch**: Attention in recent years has focused on bycatch of sea turtles and sea birds in fisheries conducted by Asian distant-water longlining fleets. Little or no information is available on sea turtle bycatch by these fleets, but some work has been done in measuring and trying to prevent sea bird bycatch by Japanese longliners operating in the Australian Exclusive Economic Zone (EEZ).[6]

Many different sea bird species can be caught by fishing gear, including albatross, petrels, shearwaters, and penguins. These birds follow longlining vessels and feed on the following: food scraps tossed overboard, fish caught by the longliners, and bait used in these fisheries. When attempting to secure said fish or bait, the birds can become entangled in the fishing gear and drown. In longline fishing, birds dive after bait while the line is being set and some become hooked and drown as the longline sinks.

Concern in Australia has centered on the bycatch of albatross in this fishery, since albatross are long-lived, late to mature, and are slow breeders that are particularly vulnerable to depletion if the mortality rate increases for any reason. It has been estimated that 44,000 albatross were killed by Japanese longliners fishing in the Southern Ocean during 1989. At that time, approximately 107 million hooks were set in the Japanese tuna longlining operation, but this number has been reduced in subsequent years resulting in reduced seabird bycatch, reportedly decreasing as much as 88 percent in 1990.

During the 1990s, Australian scientists have been working with the Japanese and Australian fishery industries to develop methods to reduce seabird bycatch. Australia has encouraged night sets to reduce albatross

bycatch, since they are not night-feeders. One of the main deterrent methods is to distract or scare birds from diving at the bait. This can be done by using a pole attached to the back of the vessel which has a long rope with streamers attached. The streamers hang down from the pole to the water where wind and waves cause them to flap above the bait, thus scaring the birds. Japanese longliners have been encouraged to use this method during the early 1990s, and have been required to use it since November 1995.

Another technique to reduce seabird bycatch is to make the baited longline hooks sink faster. This can be accomplished by using a bait throwing machine which throws bait clear of the choppy water at the back of the boat, which otherwise keeps the bait close to the surface. The use of well-thawed baits and weights on branch lines makes the bait sink faster and keep it out of the seabirds' diving range. The Japanese are also experimenting with using magnetic and sound waves to scare seabirds.

**Other Fisheries**

**Drift-/gillnetting**: High-seas driftnet fishing was widely used by Japanese, ROK, and Taiwan fleets from the mid-80s until the end of 1992. The target species of this fishery were albacore, billfish, squid, and salmon. The distant-water fishery, which employed long monofilament gillnets, had large meshes (18-20 cm) for albacore and billfish, and smaller meshes for squid and salmon (8.5-11.5 cm). As of 1993, large-scale pelagic high-seas driftnet fisheries conducted by Asian distant-water fleets have ceased in accord with the United Nations moratorium on this fishing method.

**Harpoon:** This fishing gear has been traditionally employed by Japanese fishermen, but, based on current Japanese statistics, it appears that billfish are no longer taken in this fishery. Harpoon fishing also takes place in Taiwan coastal waters, where between 100-300 t of swordfish were caught annually between 1990 and 1994, but catch dropped precipitously to just 14 t in 1995. These vessels operate primarily in the eastern region of Taiwan, from the southern ports of Kaohsiung and Taitung and from the northern port of Keelung. The fishery appears to target a complex of billfishes, with blue and black marlin ranking above swordfish in terms of preference.[7]

**Coastal Fisheries in Other Asian Countries**

**Philippines:** Swordfish is a bycatch of the tuna fishery in the Philippines. Due to the lack of a directed swordfish fishery, no fishing methods have been devised and employed to catch swordfish. Available data from the Fisheries Resources Research Division, Bureau of Fisheries and Aquatic Resources, and the Bureau of Agricultural Statistics show Filipino swordfish catch averaging 0.20 percent of total fish production between 1980 and 1993 (shown in below table). While swordfish catch grew by 45 percent in 14 years (from 1980 through 1993), industry sources attribute this growth not to increased efforts to catch more swordfish but to improved fishing methods in Philippine deep seas where highly migratory swordfish are incidentally caught.

Philippines Swordfish Catch Statistics

(Quantity in Metric Tons)

| | TOTAL MARINE CATCH | SWORDFISH CATCH | PCT SHARE |
|---|---|---|---|
| 1993 | 1,648,625 | 4,633 | 0.28 |
| 1992 | 1,659,553 | 4,256 | 0.26 |
| 1991 | 1,673,339 | 3,139 | 0.19 |
| 1990 | 1,595,604 | 3,266 | 0.20 |
| 1989 | 1,519,507 | 3,756 | 0.25 |
| 1988 | 1,438,361 | 4,034 | 0.28 |
| 1987 | 1,407,439 | 2,137 | 0.15 |
| 1986 | 1,353,505 | 2,089 | 0.15 |
| 1985 | 1,297,119 | 2,036 | 0.16 |
| 1984 | 1,303,310 | 2,274 | 0.17 |
| 1983 | 1,290,304 | 2,974 | 0.23 |
| 1982 | 1,234,289 | 3,468 | 0.28 |
| 1981 | 1,204,757 | 1,940 | 0.16 |
| 1980 | 1,135,762 | 1,716 | 0.15 |

Source: U.S. Embassy, Manila, June 27, 1995.

**Indonesia:** According to statistics compiled by the Indonesian Directorate General of Fisheries, the total tuna catch in 1992 (the most recent year for which statistics are available) was approximately 500,000 tons. Although the GOI does not keep data on swordfish catches, tuna industry representatives report that swordfish account for roughly 5 percent of total tuna hauls.

Tuna is caught in Indonesia by industrial, artisanal (i.e. subsistence), and recreational fisheries. The industrial fishery deploys only longlining vessels while the artisanal fishery employs many methods--longline, gillnet, Danish seine, troll line, and mini-purse seine. In the 1990s, the Indonesian Government has started to promote sport fishing of billfish and tunas as a way to increase tourism revenue.

Indonesia began domestic longlining in the Indian Ocean in 1972, 20 years after Japanese longliners began fishing in these grounds. Fishing grounds for this fleet include the west coast of Sumatra, south coast of Java and Lesser Sunda Islands. The industrial longline fleet is

composed of larger vessels (100-300 GRT) which have a crew of 16-24 and take trips lasting 14 to 30 days, and smaller vessels (50 GRT) which have a crew of 10 and take trips of around 10 days.[8]

Most tuna and swordfish are caught in the waters of eastern Indonesia, particularly between the island of Sulawesi (Celebes) and Irian Jaya: however, the fish are found throughout Indonesian territorial waters. Many refrigerated fishing vessels use Jakarta as their base of operations. In descending order of volume, principal ports include: Jakarta, Surabaya, Ujung Pandang, Ambon, and Kupang. Most frozen tuna is offloaded from refrigerated fishing vessels and transferred to larger vessels at port (usually Jakarta or Surabaya). Japan is the destination of most Indonesian frozen and "loin" (half-cooked and vacuum-packed) tuna. Indonesia reportedly does not import swordfish, but exports to Japan, Taiwan, the ROK, the EU, and the United States.

Indonesia has an estimated fleet of 4000 tuna boats--virtually all are wooden vessels. Indonesia generally forbids imports of fishing boats, but Indonesian Government and industry officials maintain that the prohibition is generally honored only in the breach. Still, imported or locally-made steel or fiberglass boats are out of the price range of most local companies. A new fully-rigged wooden boat costs about $150,000 - 200,000, and an average-sized tuna company has a fleet of 10-15 boats. Most wooden boats are built in Riau province, while steel boats are made by state-owned company PT PAL. Both Government and industry representatives state that local lending institutions are wary of the fishing industry in general, and obtaining credit is difficult (even at the current interest rate of 24 percent). Mainly due to the lack of locally-available capital, local tuna companies avidly seek foreign joint ventures.

The Indonesian Government has designated fisheries as a priority economic growth sector: however, industry representatives complain that the Indonesian Government has not followed up with significant policy steps such as tax breaks or subsidized credit. They report that the Government has cracked down on the number of licenses issued for foreign fishing vessels, and has prohibited foreign flag vessels over 60 t from fishing in the Indonesian EEZ. Reforms in foreign investment procedures have led to more joint tuna fishing ventures involving Taiwan and Japanese fishing companies. Crews are usually all Indonesian nationals. The boat owner usually compensates the crew by splitting the catch (either 50-50 or 60-40 in favor of the owner), with bonuses for big catches.[9]

**Sri Lanka:** Large pelagic resources, such as swordfish, have traditionally been exploited in Sri Lanka by drift gillnet gear. The Sri Lankan Exclusive Economic Zone's topography, with a sharp break in the continental shelf, has probably increased the effectiveness of this gear in exploiting these resources. A shift in effort from coastal to offshore Sri Lankan waters in the 1990s has seen an increased use of combination gears such as longline and handline together will drift gillnets. Sri Lankan artisanal vessels are also extending the lengths of their fishing trips, moving from single to multi-day excursions.

An analysis of large pelagic fishing gear types indicate that gillnets and combination gear with gillnets are responsible for around 80 percent of total fishing effort. The use of gillnets alone has declined in favor of combination gear (e.g. gillnets with longlines and/or handlines). Sri Lankan tuna vessels are generally small (from 3.5 t to 11t), with a recently introduced fleet of 13 longliners (10-60 t) which operate in offshore Sri Lankan and international waters.

Large pelagic catches between 1984 and 1991 were generally stable, but have seen a marked increase since 1991, probably due to the resumption of fisheries in the east and northeast of the island. The estimated annual catch of the deep water longliners was 1,427 t in 1991/92. Billfish accounted for an estimated 10 percent of this figure, with tuna species accounting for 88 percent. Almost fifty percent of the tuna catch is exported to the Japanese sashimi market with the balance sold on domestic markets.[10]

## II. Catch

Combined swordfish catch data submitted to the FAO by Japan, the ROK, and Taiwan showed a generally increasing trend between 1991 and 1994, with a dramatic increase in 1995 (appendix 1, figure 1). The total catch for these three fleets reached nearly 40,000 t in 1995, reflecting a big increase in landings by the fleet from Taiwan. In contrast, swordfish catch by the ROK fleet has gradually decreased, falling from over 1,200 t in 1980 to 32 t in 1994 and 98 t in 1995. Catch from the Japanese fleet comprised nearly 70 percent of the total until 1994, with the Taiwan catch comprising nearly all the remaining landings. In 1995, however, the Taiwan share of the catch rose to 50 percent, the same as the Japanese fleet.

By percentage breakdown, it is evident that the bulk of the Japanese swordfish catch comes from Pacific Ocean

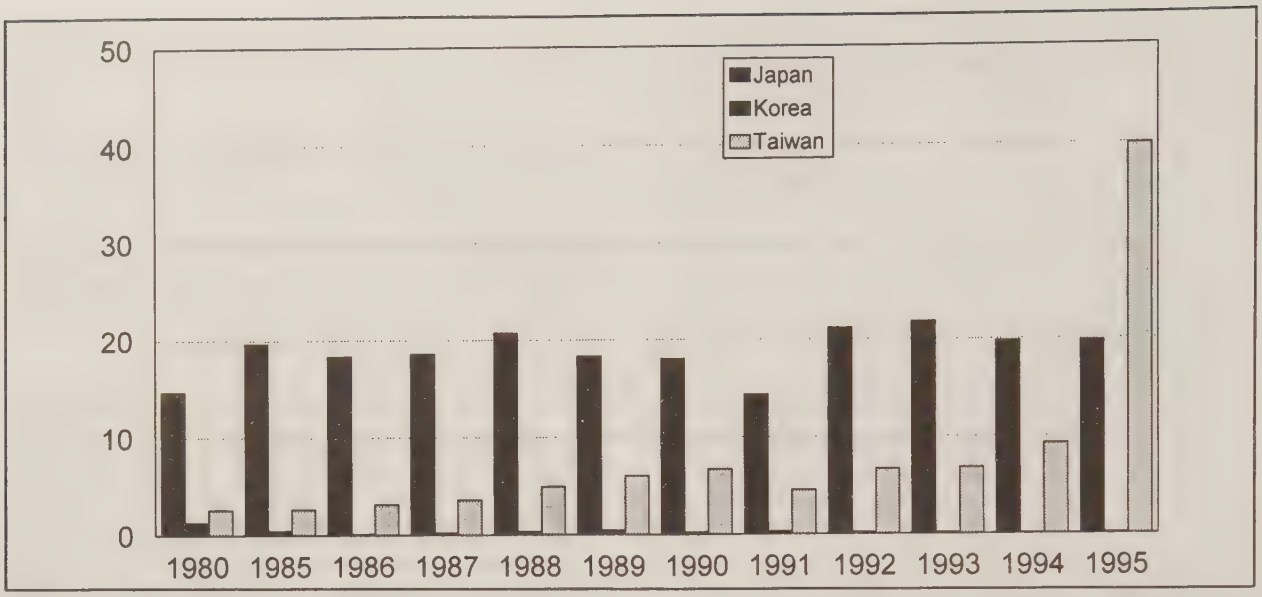


**Figure 1**--Swordfish catch in all oceans, by FAO Area, Asian distant-water fishing fleet, and quantity (metric tons in thousands), 1980, 1985-95. Note: Japanese data for 1995 data not available, so 1994 data was used. Source: FAO

coastal and distant-water fisheries, whereas the bulk of the Taiwan catch has come from Indian and Pacific Ocean fisheries (appendix 2). It is notable that Taiwan's swordfish catch from the Indian Ocean has constituted the largest share of its overall landings since 1991. The limited ROK catch tended to come from Atlantic and Pacific fisheries until 1994 and 1995 when the majority of landings came from the Indian Ocean.

**Atlantic Ocean**: In the Atlantic Ocean, it is evident from FAO and ICCAT data that Japan dominates swordfish catch among the three major Asian distant-water fleets (appendices 3 and 4). According to the FAO, Japanese swordfish catch in the Atlantic since 1990 has fluctuated between a high of 5,900 t in 1990 and a low of 2,300 t in 1980. Japanese catch was lower in 1991 and 1992 than 1990's peak, but catch increased dramatically in 1993 and 1994 to 5,400 t and 5,700 t, respectively. Taiwan's total swordfish catch in the Atlantic since 1980 has fluctuated between a high of 2,641 t in 1995 to a low of 287 t in 1986. Taiwan's catch in 1993 was just 749 t, less than half the 1992 total, but rebounded strongly in 1994 and 1995 to 2,582 t and 2,641 t, respectively. ROK swordfish catch in the Atlantic has decreased gradually, with the ROK fleet reporting zero catch to FAO between 1993 and 1995.

By FAO Area, Japan's catch has been concentrated in two areas: Area 34 (central eastern Atlantic) and Area 47 (southeastern Atlantic) (appendix 3). Japanese catch in Area 34 has fluctuated between 400 and 2,300 t between 1980 and 1994. Catch in Area 47 has fluctuated between 900 and 3,000 t, with increasing catches each year since 1991. Taiwan's catch has largely been concentrated in Area 41 (southwestern Atlantic), with catches ranging from less than 100 t in 1985 and 1986 to a high of 1,900 t in 1994 and 1995. ROK swordfish catch in the Atlantic was largely concentrated in Areas 31 and 34 (central eastern Atlantic).

Data submitted to ICCAT largely supports trends found in the FAO data (appendix 4, figure 2). The majority of Japanese catch has taken place in the South Atlantic, and of this catch, most occurred in the ICCAT East Atlantic-South Temperate region. It should be noted that Japanese longliners posted high catches between 3,600 and 4,400 t in this region between 1993 and 1995. Taiwan's reported ICCAT catch fluctuated between 700 and 1,400 t between 1990 and 1993, with most of the catch taken in the South Atlantic Temperate region. Figures for 1994 and 1995 indicate Taiwan's catch increased significantly to the 2,600 t level each year, with the majority of this catch taking place in the South Atlantic. Data submitted by the ROK to ICCAT indicates higher swordfish catch levels than the data submitted to FAO. ROK catch fluctuated between 400 and 1,100 t between 1985 and 1989, but has dropped off greatly since then to between approximately 100 and 200 tons. As with the Japanese fleet, ROK catch has been concentrated in the East Atlantic-South Temperate region.

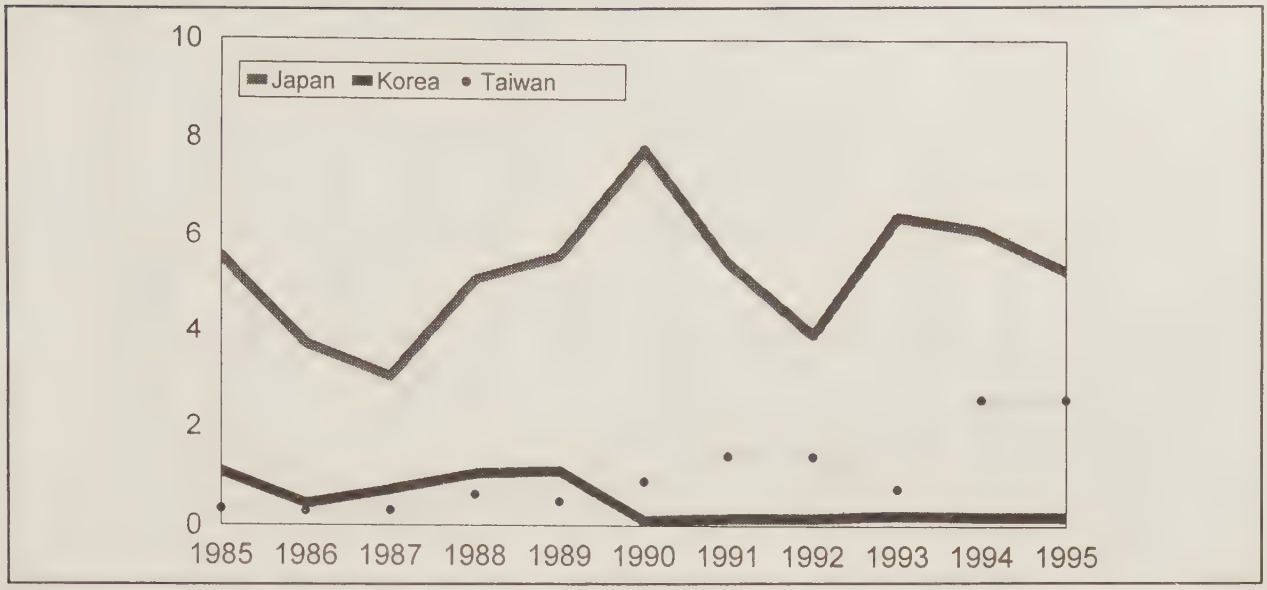


**Figure 2**---Asian distant-water fishing fleet swordfish catch in the Atlantic Ocean, by quantity (metric tons in thousands), 1985-95. Source: ICCAT

**Indian Ocean:** According to the Indo-Pacific Tuna Programme (IPTP), billfish catch in the Indian Ocean has increased gradually in the past 15 years, moving from just 10,000 t in 1980 to over 35,000 t in 1993 (appendix 5). Swordfish has been a major component of the overall billfish catch, ranging from 12 percent to 29 percent of this catch. Billfish catch in FAO Area 51 (western Indian Ocean) has mirrored the overall trend, increasing from 4,000 t in 1980 to 27,000 t in 1993 (appendix 6). Swordfish catch has comprised between 11 and 33 percent of the total billfish catch. Billfish catch in Area 57 (eastern Indian Ocean) has fluctuated between 6,000 and 11,000 t since 1980, with swordfish making up between 13 and 31 percent of the total (appendix 7). During the 1990s, catch has increased significantly (nearly 40 percent since 1989) in the western Indian Ocean, while declining somewhat in the eastern Indian Ocean.

According to the FAO, swordfish catch in the Indian Ocean among Asian fishing fleets has increased significantly since 1991, largely due to rapid increases in catch by Taiwan (appendix 8, figure 3). Japan's catch in the Indian Ocean since 1980 has fluctuated between 446 and 1,300 t since the peak catch of 1,700 t was recorded in 1985. Taiwan's catch fluctuated between 500 and 3,600 t until the 1992-93 time frame, when catch increased dramatically to the 4,500-5,000 t level. In 1995, a dramatic increase in catch was registered by the Taiwan fleet with total landings of nearly 10,000 tons. Coastal catch by Sri Lanka ranged between 300 and 1,000 t during the 1985 to 1992 time frame, but has increased dramatically since then to between 2,300 and 4,700 tons. ROK swordfish catch in the Indian Ocean has not exceeded 100 t since 1985.

By FAO Area, Japan and Taiwan catches have largely occurred in Area 51 (Western Indian Ocean). Japanese catch in this Area largely mirrors that seen in overall Indian Ocean catch, ranging from 500 to 1,200 t since 1985. Taiwan catch in this Area posted a dramatic overall increase in catch during the 1990-95 time frame when the total increased from 2,000 to nearly 9,000 tons. Japan's catch in Area 57 (Eastern Indian Ocean) has fluctuated with no clear increasing or decreasing trend. Taiwan's catch has generally declined in this Area after peaking at 1,200 t in 1989, but posted an increase to 714 t in 1995 (versus a catch of just 271 t in 1994).

Swordfish catch data submitted to the IPTP is generally consistent with that reported to FAO, but there are some notable exceptions (appendix 9). First, the ROK reports to the IPTP that its swordfish catch in the Indian Ocean has increased significantly, from just 11 t in 1991 to 1,219 tons in 1993. Trends for Japan and Taiwan's swordfish catch data are similar to those seen in FAO data. Also notable in the IPTP data is the fact that Taiwan's catch nearly doubled from 3,000 t in 1991 to 6,000 t in 1992.

The IPTP data also clearly indicates the emergence of Sri Lanka's coastal gillnet fishery as a major harvester of swordfish. This fleet caught just 848 t in 1992, but this

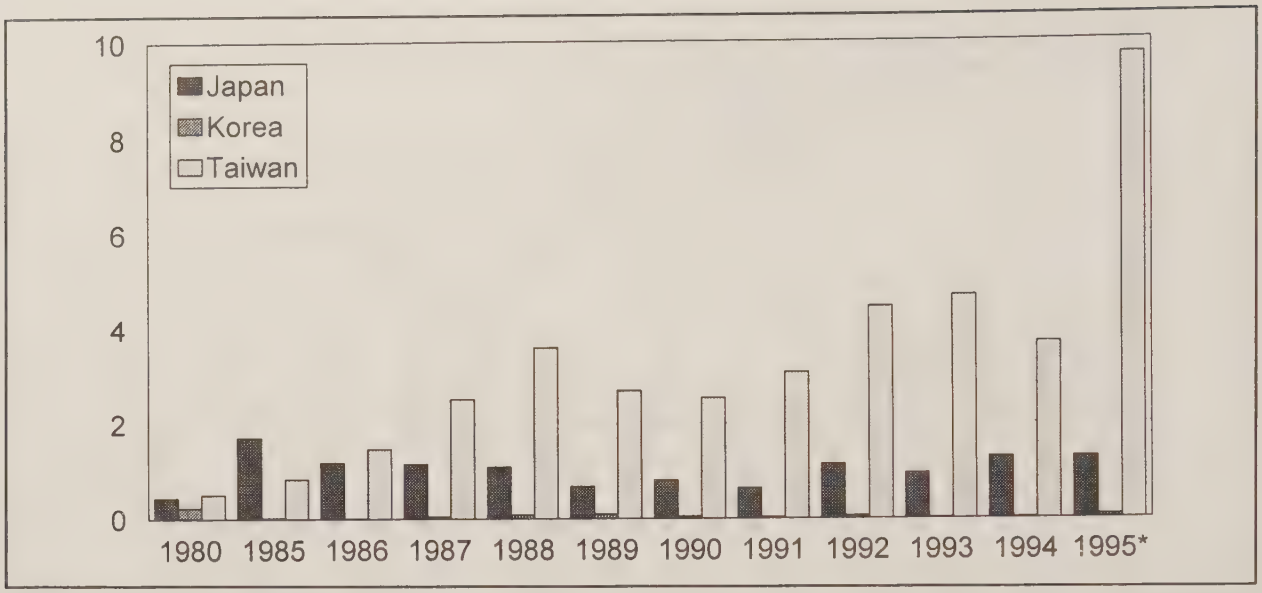


**Figure 3**---Asian distant-water fishing fleet swordfish catch in the Indian Ocean, by quantity (metric tons in thousands), 1980, 1985-95. *-Japanese data for 1995 not available, so 1994 data was used. Source: FAO

figure increased to nearly 4,500 t in 1992, a five-fold increase. Significant swordfish catch has also been registered by Indonesia's longline fleet, ranging from 200 to 800 tons since 1987. IPTP data also supports FAO data which indicate most of the Indian Ocean swordfish is caught by the ROK, Taiwan, Japan, and Sri Lanka in Area 51 (western Indian Ocean)(appendices 10 and 11).

**Pacific:** Swordfish catch figures for the Pacific submitted to FAO indicate fluctuating trends (appendix 12, figure 4). Total catch for Japan, Taiwan, the ROK, and the Philippines has ranged between 13,000 and 25,000 t since 1980, with Japan catching the most swordfish (between 10,000 and 16,000 t since 1990). The Philippines coastal swordfish catch has exceeded 3,000 t each year since 1988, and the Philippines was the second largest harvester of Pacific swordfish between 1991 and 1994. Taiwan's swordfish catch in the Pacific fluctuated between 200 and 3,000 t until 1995 when it increased dramatically to 7,700 tons, thus making Taiwan the second largest harvester of Pacific swordfish. ROK catch has been at a low level, never greater than 200 tons since 1985.

By FAO Area, Japan and Taiwan's greatest swordfish catches have taken place in Area 61 (Northwest Pacific). Japanese catch in this Area increased from 4,684 t in 1991 to 9,970 t in 1993, but decreased in 1994 to 8,760 tons. Taiwan catch fluctuated greatly in this Area between 1980 and 1993 with landings of between 300 and 2,500 tons. Since 1994, Taiwan catches have increased dramatically from 2,300 t in 1994 to 6,000 t in 1995.

Japan has also recorded significant swordfish catches in Area 77 (central eastern Pacific) and Area 81 (southwest Pacific). Japanese catch in Area 77 has generally fluctuated since 1980, but has decreased significantly in the past three years, from 3,712 t in 1992 to just 1,613 t in 1994.

In Area 81, Japanese catch has ranged between 600 and 2,200 t with no clear trend. It should be noted, however, that Japanese catch in this Area has decreased each year since 1992, a trend similar to that witnessed in Area 77.

The Taiwan fleet posted significant swordfish catch increases in the following FAO Areas during 1995: Area 71 catch increased from 200 t in 1994 to 522 t in 1995, Area 77 catch increased from 330 t in 1994 to 870 t in 1995, and Area 81 catch increased from 112 t in 1994 to 296 t in 1995.

ROK catch in the Pacific has largely taken place in FAO Area 77 (central eastern Pacific). Landings in this Area have ranged between 13 and 105 t, with the low figure reported in 1995.

Philippine swordfish catch has taken place exclusively in Area 71 (central western Pacific), the Area which includes the Philippine archipelago. Filipino catch increased significantly from 3,100 t in 1991 to over 4,600 t in 1993. Figures for 1994 indicated a decrease to 3,641 tons, but the 1995 catch increased again to 4,200 tons.

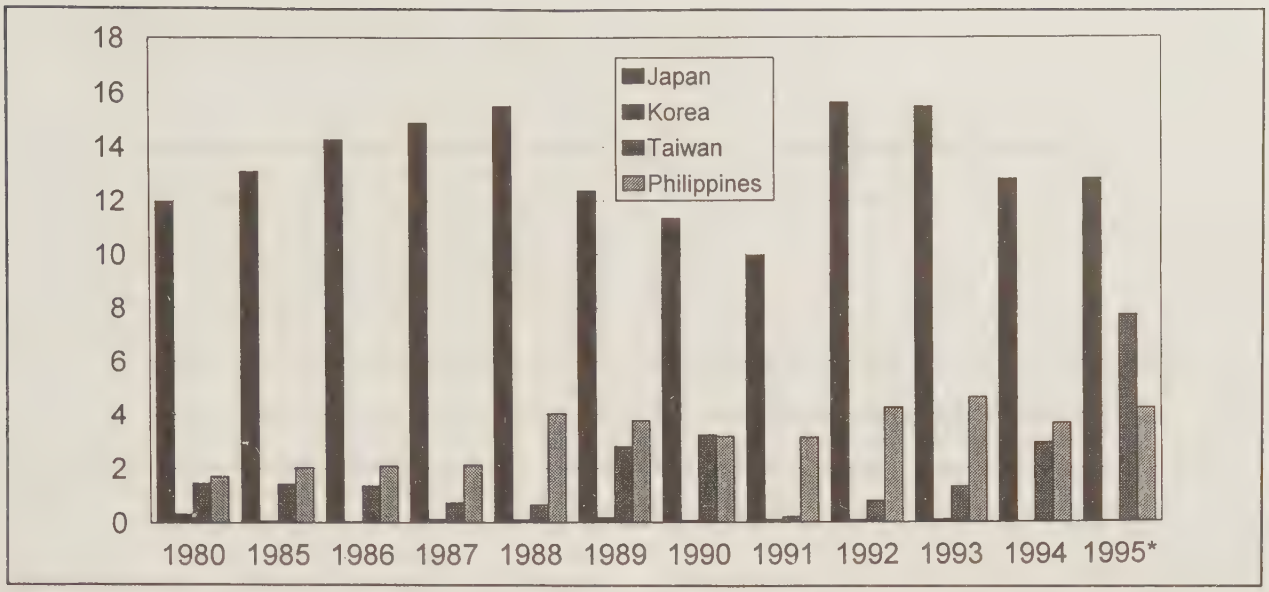


**Figure 4**--Asian swordfish catch in the Pacific Ocean, by quantity (metric tons in thousands), 1980, 1985-95. *-Japanese data for 1995 not available, so 1994 data was used. Source: FAO

## III. Grounds

The geographic distribution of swordfish varies with seasonal changes in water temperature, but can extend from 50 degrees north latitude to 50 degrees south latitude. The preferred water temperature for swordfish is 18-22 degrees Centigrade and varies with animal size. Juveniles are found in tropical regions since they prefer warmer water, but adults have a wider temperature tolerance and occupy the full distributional range, spawning in the tropics and feeding in temperate regions. Adult swordfish are found year-round in most parts of the distributional range, except extreme sub-polar latitudes in winter. They concentrate in areas of food abundance, commonly among frontal zones where ocean currents or water masses intersect to create turbulence and sharp gradients of temperature and salinity. Swordfish fishing grounds occur in the regions of these frontal zones.

**Pacific Ocean**: There are five frontal zones where swordfish are found in fishable concentrations: 1) the northwestern Pacific, where the warm Kuroshiro Current meets the coastal waters of Japan and Taiwan, and where the Kuroshiro Extension Current meets the Oyashio Current to the north; 2) off southeastern Australia where the warm East Australian Current meets intrusions of the cold Southern West Wind Drift Current; 3) off northern New Zealand, where the warm South Equatorial Current intersects with intrusions of the cold Southern West Wind Drift Current; 4) in the eastern tropical Pacific, where the warm Equatorial Counter Current intersects with the colder Peru Current, and 5) along Baja, California, Mexico, and California, United States, where the cool offshore California current intersects with intrusions along the coast of warmer water from the south.[11]

**Indian Ocean**: Swordfish occur in the Indian Ocean with areas of concentration off the coasts of India, Sri Lanka, Saudi Arabia, the east coast of Africa, and around the Cape of Good Hope. Japanese scientists have also shown areas of concentration between 20 and 40 degrees south latitude, and 60 and 100 degrees east longitude. Adult swordfish also occur in good concentrations off the southwest coast of Australia.[12]

## IV. Species

Fishery stock statistics for Indian and Pacific Ocean swordfish are incomplete and even basic biological information is limited. Consequently, the knowledge of stock status is generally poor. Swordfish exploitation in the Indian Ocean ranges from moderate to low levels, while Pacific Ocean exploitation seems to be at a moderate level.[13] United Nations Food and Agriculture Organization catch statistics in the Indian and Pacific Oceans indicate a gradual increasing trend, with total catches increasing from 18,000 t in 1980 to 36,000 t in 1992.

The stock structure of swordfish in the western, central and South Pacific is unclear. Catch distribution statistics indicate the possibility of, at least, North and South Pacific stocks. Stocks do not appear to have been exploited on a Pacific-wide basis to the extent that would cause a declining trend in catch rates.[14]

## V. Trade

Most commercial billfish landings eventually reach three markets: western Europe, Japan, and the United States. Western Europe markets are concentrated in countries of the Mediterranean, particularly Italy and Spain with supplies coming from local Spanish, Italian, and Greek fleets. Japan has established markets for nearly all major billfish species, but the market is limited primarily to swordfish in the United States.

**European Market:** Swordfish trade statistics from the European Union (EU) are broken down into four commodity categories: fresh, frozen, frozen fillet, and frozen meat. The EU imports a negligible amount of fresh swordfish from Asian countries--Sri Lanka, Singapore, Malaysia, Taiwan, French Polynesia, Indonesia, and Australia are the only countries to export fresh swordfish to the EU during the 1991-95 time frame (appendix 13). It should be noted that Sri Lanka is the only country to export fresh swordfish each year during this time.

With regard to frozen swordfish, imports from the Asia-Pacific region have been dominated by Indonesia, Singapore, Japan, and Taiwan, with Singapore and Taiwan being far and away the leading exporters (appendix 14). These two exporters shipped a total of over 2,500 t of frozen swordfish valued at almost $7 million in 1994. In 1995, however, both exporters shipped far less swordfish to the EU market--approximately 1,400 t valued at $3.1 million. Taiwan and Singapore have also been the leading exporters of frozen fillets, although at relatively low quantities (appendix 15). The EU has imported negligible quantities of frozen swordfish meat from Asian countries, largely from Taiwan and Indonesia (appendix 16).

**Japanese Market:** Billfish are handled, sold, and consumed as types of tuna in Japan. The market is primarily for high-quality billfish, eaten raw in *sashimi* or *sushi*. The product must be fresh, or if frozen, kept at low temperatures (-50 to -60 degrees centigrade) for retention of desired qualities. The Japanese distant-water longliner fleet is the primary source for domestic supplies.[15] Dockside prices in Japan for the major billfish species have exceeded those for major commercial tuna species.[16] For an analysis of Japanese trade statistics, see the Japan chapter of this study.

**United States Market**: The U.S. billfish market has been limited primarily to fresh or frozen swordfish. Consumption of swordfish has increased dramatically as U.S. consumers purchase more and more fish, such as tuna and swordfish, which have firm white flesh and can be barbecued like chicken or red meat. About half the U.S. supply comes from the U.S. fleet and half from foreign fleets, including Canada, Spain, and Taiwan.[17]

U.S. trade statistics for fresh swordfish indicate that there are no consistent Asia-Pacific suppliers of a significant amount of product. During the period 1991-94, fresh swordfish was imported primarily from Fiji, New Zealand, and Taiwan (appendix 17). In 1995, fresh imports from Fiji dominated the market, totaling 213 t valued at $778,000. Imports of fresh product from Fiji have increased dramatically since 1993.

With regard to frozen swordfish, a small number of Asian exporters ship their product to the United States. The three major Asia-Pacific players have traditionally been Japan, Singapore, and Taiwan. The level of imports from these three sources fluctuated through 1994, with no clear upward or downward pattern (appendix 18). Imports from these three suppliers all declined significantly in 1995, while imports from China, a relatively new supply source, increased greatly over 1994.

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## Endnotes

1. Much of the material in the section describing longline fishing comes from the following source: "Pelagic Fishing Methods in the Pacific," Western Pacific Regional Fishery Management Council 1995.

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6. Information in this section is taken from "Seabirds and Fishing," Australia Department of Primary Industries and Energy, March 1995.

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## Appendices--Catch

Appendix 1. Swordfish catch in all oceans, by FAO area, Pacific Rim distant-water fishing country, year, and quantity, 1980, 1985-95.

| FAO Area/ Country | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| Japan | 14,675 | 19,642 | 18,332 | 18,565 | 20,705 | 18,311 | 18,043 | 14,341 | 21,152 | 21,808 | 19,776 | 19,776* |
| Republic of Korea | 1,248 | 427 | 125 | 245 | 316 | 432 | 234 | 290 | 164 | 129 | 32 | 98 |
| Taiwan | 2,575 | 2,599 | 3,112 | 3,554 | 4,905 | 6,001 | 6,681 | 4,696 | 6,655 | 6,764 | 9,225 | 20,051 |
| **Total** | 18,498 | 22,668 | 21,569 | 22,364 | 25,926 | 24,744 | 24,958 | 19,327 | 27,971 | 28,701 | 29,033 | 39,925 |

*--Japanese 1995 data not available, so 1994 data was used.
Source: United Nations Food and Agriculture Organization.

Appendix 2. Swordfish catch breakdown percentages in all oceans, by country, year, and quantity, 1980, 1985-95.

| FAO Area/ Country | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| **Japan** | | | | | | | | | | | | |
| Atlantic Ocean | 16 | 25 | 16 | 14 | 20 | 29 | 33 | 26 | 21 | 25 | 29 | 29* |
| Indian Ocean | 3 | 9 | 6 | 6 | 5 | 4 | 5 | 5 | 5 | 4 | 7 | 7* |
| Pacific Ocean | 81 | 66 | 78 | 80 | 75 | 67 | 62 | 69 | 74 | 71 | 65 | 65* |
| **Republic of Korea** | | | | | | | | | | | | |
| Atlantic Ocean | 55 | 81 | 66 | 31 | 39 | 38 | 43 | 52 | 10 | 0 | 0 | 0 |
| Indian Ocean | 19 | 6 | 5 | 20 | 27 | 22 | 22 | 11 | 37 | 16 | 53 | 78 |
| Pacific Ocean | 26 | 13 | 29 | 49 | 34 | 40 | 35 | 37 | 53 | 84 | 47 | 22 |
| **Taiwan** | | | | | | | | | | | | |
| Atlantic Ocean | 24 | 13 | 9 | 8 | 13 | 8 | 14 | 27 | 21 | 11 | 28 | 13 |
| Indian Ocean | 20 | 32 | 47 | 71 | 74 | 45 | 38 | 68 | 67 | 69 | 40 | 48 |
| Pacific Ocean | 56 | 55 | 44 | 21 | 13 | 47 | 48 | 5 | 12 | 20 | 32 | 39 |

*---Japanese 1995 data not available, so 1994 data was used.
Source: United Nations Food and Agriculture Organization

Appendix 3. Swordfish catch in the Atlantic Ocean, by FAO area, Pacific Rim distant-water fishing country, year, and quantity, 1980, 1985-95.

| FAO Area/ Country | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| Area 21–Northwestern Atlantic | | | | | | | | | | | | |
| Japan | 367 | 245 | 272 | 164 | 197 | 174 | 200 | 183 | 199 | 106 | 62 | 62* |
| Taiwan | – | 37 | 22 | 2 | 3F | 3F | – | – | – | – | – | – |
| Area 27–Northeastern Atlantic | | | | | | | | | | | | |
| Japan | 15 | 33 | 18 | 32 | 37 | 38 | 36 | 94 | 85 | 41 | 42 | 42* |
| Taiwan | – | 15 | 18 | 13 | 21F | 21F | – | – | – | – | – | – |
| Area 31–Central Western Atlantic | | | | | | | | | | | | |
| Japan | 3 | 86 | 28 | 20 | 17 | 152 | 64 | 40 | 35 | 33 | 33 | 33* |
| Republic of Korea | – | 84 | 21 | 19 | 45 | 54 | 23 | – | – | – | – | – |
| Taiwan | 53 | 83 | 69 | 57 | 10 | 10 | 168 | 400 | 100 | 80 | 350 | 350 |
| Area 34–Central Eastern Atlantic | | | | | | | | | | | | |
| Japan | 714 | 1,704 | 444 | 790 | 1,420 | 1,908 | 2,230 | 936 | 1,277 | 2,338 | 1,993 | 1,993* |
| Republic of Korea | 664 | 119 | 10 | – | 72 | 84 | 78 | 150 | 17 | – | – | – |
| Taiwan | 44 | 18 | 13 | 13 | 8 | 3 | 40F | 174 | 32F | 18F | 80 | 79 |
| Area 37–Mediterranean | | | | | | | | | | | | |
| Japan | 1 | 15 | 7 | 3 | 4 | 2 | 2 | 1 | 2 | 5 | 4 | 4* |
| Area 41–Southwestern Atlantic | | | | | | | | | | | | |
| Japan | 136 | 342 | 574 | 593 | 772 | 718 | 1,253 | 941 | 907 | 472 | 577 | 577* |
| Republic of Korea | 19 | 134 | 51 | 56 | 6 | 24 | – | – | – | – | – | – |
| Taiwan | 259 | 81 | 59 | 169 | 400 | 300 | 543F | 667 | 1,071F | 551F | 1,860F | 1,900 |
| Area 47–Southeasten Atlantic | | | | | | | | | | | | |
| Japan | 1,040 | 2,423 | 1,553 | 944 | 1,668 | 2,270 | 2,106 | 1,570 | 1,883 | 2,406 | 2,964 | 2,964* |
| Republic of Korea | – | 7 | – | – | – | – | – | – | – | – | – | – |
| Taiwan | 250 | 98 | 106 | 46 | 214 | 169 | 150F | 170F | 200F | 100F | 291 | 312 |
| **Total Atlantic Ocean** | | | | | | | | | | | | |
| Japan | 2,276 | 4,848 | 2,896 | 2,546 | 4,115 | 5,262 | 5,891 | 3,765 | 4,388 | 5,401 | 5,675 | 5,675* |
| Republic of Korea | 683 | 344 | 82 | 75 | 123 | 162 | 101 | 150 | 17 | 0 | 0 | 0 |
| Taiwan | 606 | 332 | 287 | 300 | 656 | 506 | 901F | 1,411 | 1,403F | 749F | 2,581 | 2,641 |
| **Total** | 3,565 | 5,524 | 3,265 | 2,921 | 4,894 | 5,930 | 6,893 | 5,326 | 5,808 | 6,150 | 8,256 | 8,316 |

*–1995 Japanese data not available, so 1994 data was used.
Source: United Nations Food and Agriculture Organization
F=FAO Estimate.

Appendix 4. Swordfish catch by Asian distant-water fleets in the Atlantic and Mediterranean, by gear and area, 1985-95.

| Country | Gear | Area | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| | | | *Metric tons* | | | | | | | | | | |
| Brazil-Japan | LLFB | SW | 227 | 304 | 511 | 470 | 241 | 679 | 122 | 33 | 85 | 109 | 53 |
| Brazil-Taiwan | LLFB | SW | -- | -- | -- | -- | -- | -- | 527 | 1,200 | 1,014 | 217 | 311 |
| Brazil-Republic of Korea | LLFB | SW | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19 | 33 |
| Japan | LLHB | North | 921 | 807 | 413 | 621 | -- | -- | -- | -- | -- | -- | -- |
| | LLHB | South | 4,613 | 2,913 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | LLHB | Medi | 14 | 7 | 3 | 4 | 1 | 2 | 1 | 2 | 4 | 3 | 0 |
| | LLHB | NE | -- | -- | -- | -- | 850 | 594 | 610 | 790 | 757 | 776 | 931 |
| | LLHB | NW | -- | -- | -- | -- | 99 | 47 | 22 | 88 | 41 | 33 | 38 |
| | LLHB | NWC | -- | -- | -- | -- | 623 | 410 | 360 | 186 | 328 | 169 | 234 |
| | LLHB | SE | -- | -- | 1,802 | 3,481 | 3,203 | 4,754 | 2,502 | 1,750 | 4,217 | 4,391 | 3,625 |
| | LLHB | SW | -- | -- | 818 | 972 | 816 | 1,954 | 1,957 | 1,120 | 1,039 | 751 | 459 |
| Japan Total | | | 5,548 | 3,727 | 3,036 | 5,078 | 5,582 | 7,761 | 5,452 | 3,936 | 6,386 | 6,123 | 5,287 |
| Republic of Korea | LLFB | North | -- | -- | 60 | -- | 320 | 51 | 3 | 3 | 19 | 16 | 16 |
| | LLFB | South | -- | -- | -- | -- | -- | 50 | 147 | 147 | 198 | 164 | 164 |
| | LLFB | NE | 80 | 22 | -- | 27 | -- | -- | -- | -- | -- | -- | -- |
| | LLFB | NWC | 68 | 46 | -- | 3 | -- | -- | -- | -- | -- | -- | -- |
| | LLFB | SE | 319 | 106 | 469 | 769 | 310 | -- | -- | -- | -- | -- | -- |
| | LLFB | SW | 598 | 263 | 197 | 243 | 466 | -- | -- | -- | -- | -- | -- |
| | LLFB | WTRO | 12 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Republic of Korea Total | | | 1,077 | 437 | 726 | 1,042 | 1,096 | 101 | 150 | 150 | 217 | 180 | 180 |
| Taiwan | LLFB | North | 117 | 121 | 40 | 18 | 13 | 207 | 574 | 132 | 98 | 372 | 429 |
| | LLFB | South | 215 | 166 | 260 | 614 | 469 | 689 | 837 | 1,271 | 651 | 2,210 | 2,151 |
| Taiwan Total | | | 332 | 287 | 300 | 632 | 482 | 896 | 1,411 | 1,403 | 749 | 2,582 | 2,580 |
| Grand Total | | | 7,184 | 4,755 | 4,573 | 7,222 | 7,401 | 9,437 | 7,662 | 6,722 | 8,451 | 9,230 | 8,444 |

Source: Swordfish Executive Summary (Draft), International Commission for the Conservation of Atlantic Tunas.

Gear Abbreviations:
LLFB= Individual foreign-based longliners
LLHB=Individual home-based longliners

Area Abbreviations:
SW=West Atlantic-South Temperate, North=Unclassified North Temperate, South Unclassified South Temperate, Medi=Mediterranean and adjacent seas, NE=East Atlantic-North Temperate, NW=West Atlantic-North Temperate, NWC=West Atlantic-North Central Temperate, SE=East Atlantic-South Temperate, SW=West Atlantic-South Temperate, WTRO=West Atlantic-Tropical

Appendix 5. Billfish catch in the Indian Ocean, by species, in metric tons, 1980, 1985-93.

| Species | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
| Indo-Pacific Blue Marlin | 2,440 | 3,484 | 4,063 | 4,738 | 6,750 | 4,796 | 6,848 | 7,338 | 7,669 | 6,708 |
| Black Marlin | 180 | 1,216 | 1,547 | 1,183 | 1,994 | 1,434 | 1,641 | 1,314 | 2,066 | 3,388 |
| Striped Marlin | 3,025 | 4,910 | 4,527 | 3,688 | 2,534 | 1,939 | 1,248 | 1,785 | 2,072 | 4,024 |
| Sailfish | 312 | 2,001 | 1,354 | 1,429 | 3,791 | 2,858 | 4,081 | 4,551 | 3,278 | 5,139 |
| Swordfish | 1,197 | 3,491 | 3,846 | 4,253 | 5,694 | 4,502 | 5,526 | 5,777 | 9,630 | 7,915 |
| Other Billfish | 2,663 | 5,367 | 5,650 | 5,671 | 5,637 | 10,589 | 11,502 | 10,389 | 9,005 | 7,840 |
| Total | 9,817 | 20,469 | 20,987 | 20,962 | 26,400 | 26,118 | 30,846 | 31,154 | 33,750 | 35,014 |
| Swordfish as Percent of Total | 12% | 17% | 18% | 20% | 22% | 17% | 18% | 19% | 29% | 23% |

Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 6. Billfish catch in the Western Indian Ocean (FAO Area 51), by species, in metric tons, 1980, 1985-93.

| Species | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
| Indo-Pacific Blue Marlin | 872 | 1,725 | 2,754 | 3,564 | 5,216 | 3,115 | 4,302 | 5,427 | 5,554 | 4,462 |
| Black Marlin | 27 | 419 | 962 | 703 | 1,478 | 929 | 1,088 | 886 | 1,665 | 3,006 |
| Striped Marlin | 686 | 2,685 | 2,382 | 1,776 | 1,556 | 1,001 | 589 | 1,144 | 1,402 | 2,995 |
| Sailfish | 173 | 1,896 | 1,233 | 1,365 | 3,407 | 2,461 | 3,295 | 3,912 | 2,658 | 4,204 |
| Swordfish | 432 | 2,025 | 2,565 | 2,687 | 3,779 | 2,495 | 3,370 | 4,270 | 7,988 | 6,630 |
| Other Billfish | 1,912 | 4,604 | 5,028 | 4,881 | 4,865 | 7,387 | 7,483 | 6,574 | 5,228 | 5,353 |
| Total | 4,102 | 13,354 | 14,924 | 14,976 | 20,301 | 17,388 | 20,127 | 22,213 | 24,495 | 26,650 |
| Swordfish as Percent of Total | 11% | 15% | 17% | 18% | 19% | 14% | 17% | 19% | 33% | 25% |

Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 7. Billfish catch in the Eastern Indian Ocean (FAO Area 57), by species, in metric tons, 1980, 1985-93.

| Species | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
| Indo-Pacific Blue Marlin | 1,568 | 1,759 | 1,309 | 1,174 | 1,534 | 1,681 | 2,546 | 1,911 | 2,145 | 2,246 |
| Black Marlin | 153 | 797 | 585 | 480 | 516 | 505 | 553 | 428 | 401 | 382 |
| Striped Marlin | 2,339 | 2,225 | 2,145 | 1,912 | 978 | 938 | 659 | 641 | 670 | 1,029 |
| Sailfish | 139 | 105 | 121 | 64 | 384 | 397 | 786 | 639 | 620 | 935 |
| Swordfish | 765 | 1,466 | 1,281 | 1,566 | 1,915 | 2,007 | 2,156 | 1,507 | 1,642 | 1,285 |
| Other Billfish | 751 | 763 | 622 | 790 | 772 | 3,202 | 4,019 | 3,815 | 3,777 | 2,487 |
| Total | 5,715 | 7,115 | 6,063 | 5,986 | 6,099 | 8,730 | 10,719 | 8,941 | 9,255 | 8,364 |
| Swordfish as Percent of Total | 13% | 21% | 21% | 26% | 31% | 23% | 20% | 17% | 18% | 15% |

Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 8. Swordfish catch in the Indian Ocean, by FAO area, Pacific Rim fishing country, year, and quantity, 1980, 1985-95.

| FAO Area/ Country | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| Area 51-Western Indian Ocean | | | | | | | | | | | | |
| Japan | 172 | 1,147 | 870 | 776 | 829 | 504 | 592 | 380 | 1,023 | 664 | 930 | 930* |
| Republic of Korea | 98 | 27 | 3 | 34 | 35 | 34 | 26 | 17 | 60 | 20 | 17 | 74 |
| Taiwan | 157 | 309 | 806 | 1,516 | 2,426 | 1,396 | 1,988 | 2,636 | 3,773F | 3,960F | 3,431 | 8,984 |
| Sri Lanka | 0 | 411 | 371 | 403 | 394 | 327 | 575 | 927 | 872 | 4,662 | 2,407 | 2,315 |
| Area 57-Eastern Indian Ocean | | | | | | | | | | | | |
| Japan | 274 | 564 | 315 | 376 | 265 | 178 | 219 | 260 | 122 | 285 | 363 | 363* |
| Republic of Korea | 138 | -- | 3 | 15 | 49 | 62 | 26 | 15 | -- | -- | -- | 2 |
| Taiwan | 353 | 529 | 662 | 994 | 1,177 | 1,289 | 545 | 441 | 679F | 728 | 271 | 714 |
| **Total Indian Ocean** | | | | | | | | | | | | |
| Japan | 446 | 1,711 | 1,185 | 1,152 | 1,094 | 682 | 811 | 640 | 1,145 | 949 | 1,293 | 1,293* |
| Republic of Korea | 236 | 27 | 6 | 49 | 84 | 96 | 52 | 32 | 60 | 20 | 17 | 76 |
| Taiwan | 510 | 838 | 1,468 | 2,510 | 3,603 | 2,685 | 2,533 | 3,077 | 4,452F | 4,688 | 3,702 | 9,698 |
| Sri Lanka | 0 | 411 | 371 | 403 | 394 | 327 | 575 | 927 | 872 | 4,662 | 2,407 | 2,315 |
| **Total** | 1,192 | 2,987 | 3,030 | 4,114 | 5,175 | 3,790 | 3,971 | 4,676 | 6,529 | 10,319 | 7,419 | 13,382 |

*--1995 Japanese data unavailable, so 1994 data was used.
F=FAO Estimate.
Source: United Nations Food and Agriculture Organization

Appendix 9. Swordfish catch in the Indian Ocean, by species, country, and gear, 1980, 1985-93.

| Country | Gear | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
| | | *Metric tons* | | | | | | | | | |
| Australia | LL | -- | -- | -- | -- | -- | 37 | -- | 5 | 2 | 13 |
| Taiwan | Gillnet | -- | -- | 182 | 63 | 274 | 121 | 105 | 43 | 6 | -- |
| | LL | 510 | 1,291 | 1,980 | 2,447 | 3,329 | 2,564 | 2,430 | 3,034 | 5,836 | NA |
| Taiwan Total | | 510 | 1,291 | 2,162 | 2,510 | 3,603 | 2,685 | 2,535 | 3,077 | 5,842 | NA |
| France | LL | -- | -- | -- | -- | -- | -- | -- | 2 | 6 | 141 |
| Honduras | LL | -- | -- | -- | -- | -- | 34 | 36 | 40 | 109 | 85 |
| India | LL | -- | 8 | 86 | 112 | 92 | 230 | 639 | 639 | 190 | 190 |
| Indonesia | LL | -- | 58 | 51 | 185 | 390 | 375 | 808 | 659 | 662 | 662 |
| Japan | LL | 446 | 1,665 | 1,150 | 1,117 | 1,095 | 667 | 853 | 410 | 1,151 | 882 |
| Kenya | Troll | -- | -- | -- | -- | -- | -- | -- | -- | 2 | 4 |
| Republic of Korea | LL | 236 | 42 | 10 | 75 | 120 | 147 | 80 | 11 | 754 | 1,219 |
| Oman | LL | -- | -- | -- | -- | -- | -- | -- | 9 | 5 | 35 |
| Russia | LL | -- | -- | -- | 37 | -- | -- | -- | -- | -- | -- |
| Sri Lanka | Gillnet | -- | 352 | 357 | 215 | 390 | 323 | 560 | 917 | 848 | 4,498 |
| | LL | -- | 52 | 4 | 2 | 4 | 4 | 15 | 8 | -- | 162 |
| | PS | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2 |
| | Troll | -- | 7 | -- | -- | -- | -- | -- | -- | -- | -- |
| Sri Lanka Total | | -- | 411 | 361 | 217 | 394 | 327 | 575 | 925 | 848 | 4,662 |
| Yemen | Uncl | -- | 16 | 26 | -- | -- | -- | -- | -- | -- | -- |
| NEI | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | 93 |
| Species Total | | 1,192 | 3,491 | 3,846 | 4,253 | 5,694 | 4,502 | 5,526 | 5,777 | 9,630 | 7,915 |

Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 10. Swordfish catch in the Western Indian Ocean (FAO Area 51), by species, country, and gear, 1980, 1985-93.

| Country | Gear | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
| | | *Metric tons* | | | | | | | | | |
| Australia | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Taiwan | Gillnet | -- | -- | -- | 2 | 24 | 35 | 51 | 15 | 2 | NA |
| | LL | 157 | 476 | 1,241 | 1,514 | 2,402 | 1,361 | 1,873 | 2,621 | 5,161 | NA |
| Taiwan Total | | 157 | 476 | 1,241 | 1,516 | 2,426 | 1,396 | 1,924 | 2,636 | 5,163 | NA |
| France | LL | -- | -- | -- | -- | -- | -- | -- | 2 | 65 | 141 |
| Honduras | LL | -- | -- | -- | -- | -- | 34 | 36 | 40 | 109 | 85 |
| India | LL | -- | 6 | 71 | 92 | 75 | 188 | 265 | 265 | 10 | 10 |
| Indonesia | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Japan | LL | 172 | 1,074 | 861 | 773 | 830 | 498 | 530 | 382 | 1,039 | 514 |
| Kenya | Troll | -- | -- | -- | -- | -- | -- | -- | -- | 2 | 4 |
| Republic of Korea | LL | 98 | 42 | 5 | 52 | 54 | 52 | 40 | 11 | 747 | 1,157 |
| Oman | LL | -- | -- | -- | -- | -- | -- | -- | 9 | 5 | 35 |
| Russia | LL | -- | -- | -- | 37 | -- | -- | -- | -- | -- | -- |
| Sri Lanka | Gillnet | -- | 352 | 357 | 215 | 390 | 323 | 560 | 917 | 848 | 4,498 |
| | LL | -- | 52 | 4 | 2 | 4 | 4 | 15 | 8 | -- | 162 |
| | PS | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2 |
| | Troll | -- | 7 | -- | -- | -- | -- | -- | -- | -- | -- |
| Sri Lanka Total | | -- | 411 | 361 | 217 | 394 | 327 | 575 | 925 | 848 | 4,662 |
| Yemen | Uncl | -- | 16 | 26 | -- | -- | -- | -- | -- | -- | -- |
| NEI | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | 22 |
| Species Total | | 427 | 2,025 | 2,565 | 2,687 | 3,779 | 2,495 | 3,370 | 4,270 | 7,988 | 6,630 |

Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 11. Swordfish catch in the Eastern Indian Ocean (FAO Area 57), by species, country, and gear, 1980, 1985-93.

| Country | Gear | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
| | | *Metric tons* | | | | | | | | | |
| Australia | LL | -- | -- | -- | -- | -- | 37 | -- | 5 | 2 | 13 |
| Taiwan | Gillnet | -- | -- | 182 | 61 | 250 | 86 | 54 | 28 | 4 | NA |
| | LL | 353 | 815 | 739 | 933 | 927 | 1,203 | 557 | 413 | 675 | NA |
| Taiwan Total | | 353 | 815 | 921 | 994 | 1,177 | 1,289 | 611 | 441 | 679 | NA |
| France | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Honduras | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| India | LL | -- | 2 | 15 | 20 | 17 | 42 | 374 | 374 | 180 | 180 |
| Indonesia | LL | -- | 58 | 51 | 185 | 390 | 375 | 808 | 659 | 662 | 662 |
| Japan | LL | 274 | 591 | 289 | 344 | 265 | 169 | 323 | 28 | 112 | 368 |
| Kenya | Troll | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Republic of Korea | LL | 138 | -- | 5 | 23 | 66 | 95 | 40 | -- | 7 | 62 |
| Oman | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Russia | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sri Lanka | Gillnet | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | PS | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Troll | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Sri Lanka Total | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Yemen | Uncl | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NEI | LL | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Species Total | | 765 | 1,466 | 1,281 | 1,566 | 1,915 | 2,007 | 2,156 | 1,507 | 1,642 | 1,285 |

Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 12. Swordfish catch in the Pacific Ocean, by FAO area, country, year, and quantity, 1980, 1985-95.

| FAO Area/ Country | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| Area 61-Northwest Pacific Ocean | | | | | | | | | | | | |
| Japan | 6,323 | 8,324 | 8,889 | 8,382 | 7,977 | 6,251 | 5,561 | 4,684 | 7,840 | 9,970 | 8,760 | 8,760* |
| Republic of Korea | -- | -- | -- | -- | -- | 1 | -- | -- | -- | -- | -- | -- |
| Taiwan | 1,158F | 1,179F | 1,120F | 474F | 356F | 2,118F | 2,457F | 61F | 500F | 972 | 2,300 | 6,024 |
| Area 67-Northeast Pacific Ocean | | | | | | | | | | | | |
| Japan | -- | 162 | 25 | 28 | 70 | 86 | 12 | 30 | 25 | -- | 6 | 6* |
| Republic of Korea | -- | -- | -- | -- | 2 | -- | -- | -- | -- | -- | -- | -- |
| Area 71-Central western Pacific Ocean | | | | | | | | | | | | |
| Japan | 1,214 | 1,104 | 1,034 | 787 | 627 | 921 | 718 | 503 | 837 | 748 | 679 | 679* |
| Republic of Korea | 66 | 1 | 14 | 39 | 48 | 120 | 45 | -- | 9 | 27 | -- | 9 |
| Taiwan | 70 | 92F | 87F | 100F | 110F | 200F | 230F | 67F | 80F | 94F | 200F | 522 |
| Philippines | 1,716 | 2,036 | 2,089 | 2,137 | 4,034 | 3,756 | 3,187 | 3,139 | 4,256 | 4,633 | 3,641 | 4,202 |
| Area 77-Central eastern Pacific Ocean | | | | | | | | | | | | |
| Japan | 3,299 | 2,416 | 2,767 | 3,889 | 4,053 | 3,480 | 3,173 | 2,837 | 3,712 | 2,691 | 1,613 | 1,613* |
| Republic of Korea | 23 | 54 | 23 | 81 | 59 | 51 | 36 | 105 | 78 | 82 | 15 | 13 |
| Taiwan | 117F | 137F | 130F | 150F | 160F | 400F | 460F | 40F | 180F | 210F | 330F | 870 |
| Area 81--Southwest Pacific Ocean | | | | | | | | | | | | |
| Japan | 583 | 823 | 1,114 | 1,240 | 1,845 | 1,218 | 1,114 | 1,124 | 2,178 | 1,332 | 1,061 | 1,061* |
| Republic of Korea | 198 | 1 | -- | 1 | -- | 2 | -- | -- | -- | -- | -- | -- |
| Taiwan | 114 | 21F | 20F | 20F | 20F | 92F | 100F | 40F | 40F | 51F | 112 | 296 |
| Area 87-Southeast Pacific Ocean | | | | | | | | | | | | |
| Japan | 534 | 254 | 422 | 541 | 924 | 411 | 763 | 758 | 1,027 | 717 | 689 | 689* |
| Republic of Korea | 42 | -- | -- | -- | -- | -- | -- | 3 | -- | -- | -- | -- |
| **Total Pacific Ocean** | | | | | | | | | | | | |
| Japan | 11,953 | 13,083 | 14,251 | 14,867 | 15,496 | 12,367 | 11,341 | 9,936 | 15,619 | 15,458 | 12,808 | 12,808 |
| Republic of Korea | 329 | 56 | 37 | 121 | 109 | 174 | 81 | 108 | 87 | 109 | 15 | 22 |
| Taiwan | 1,459F | 1,429F | 1,357F | 744F | 646F | 2,810F | 3,247F | 208F | 800F | 1,327F | 2,942F | 7,712 |
| Philippines | 1,716 | 2,036 | 2,089 | 2,137 | 4,034 | 3,756 | 3,187 | 3,139 | 4,256 | 4,633 | 3,641 | 4,202 |
| Grand Total | 15,457 | 16,604 | 17,734 | 17,869 | 20,285 | 19,107 | 17,856 | 13,391 | 20,762 | 21,527 | 19,406 | 24,744 |

Source: United Nations Food and Agriculture Organization
*--Japanese data for 1995 not available, so 1994 data used.
F=FAO estimate.

Appendix 13. European Union fresh swordfish imports from Asia, 1991-95, by quantity and value.

| Country | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val |
| | *Metric tons/US$1,000* | | | | | | | | | |
| Sri Lanka | 3 | 6 | 8 | 18 | 11 | 25 | 22 | 81 | 23 | 117 |
| Singapore | -- | -- | -- | -- | 1 | 5 | -- | -- | -- | -- |
| Indonesia | -- | -- | -- | -- | -- | -- | -- | -- | 2 | 9 |
| Malaysia | 1 | 1 | -- | -- | -- | -- | -- | -- | negl | 1 |
| Taiwan | 12 | 36 | -- | -- | -- | -- | 25 | 71 | -- | -- |
| French Polynesia | -- | -- | -- | -- | 3 | 22 | -- | -- | -- | -- |
| Australia | -- | -- | -- | -- | -- | -- | negl | 1 | -- | -- |
| **Total** | 16 | 43 | 8 | 18 | 15 | 52 | 47 | 153 | 25 | 127 |

Source: Eurostat data

Appendix 14. European Union frozen swordfish imports from Asia, 1991-95, by quantity and value.

| Country | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val |
| | *Metric tons/US$1,000* | | | | | | | | | |
| Sri Lanka | 26 | 51 | 38 | 95 | -- | -- | 5 | 29 | 67 | 95 |
| India | -- | -- | 14 | 32 | 6 | 5 | -- | -- | 1 | 2 |
| Bangladesh | -- | -- | 24 | 19 | -- | -- | -- | -- | -- | -- |
| Thailand | -- | -- | 15 | 44 | 2 | 6 | -- | -- | -- | -- |
| Indonesia | 21 | 52 | 150 | 370 | 194 | 510 | 159 | 362 | 229 | 465 |
| Malaysia | 85 | 188 | 64 | 152 | 20 | 57 | 14 | 33 | 91 | 188 |
| Singapore | 351 | 848 | 915 | 2,195 | 657 | 1,745 | 986 | 2,630 | 691 | 1,602 |
| Burma | -- | -- | -- | -- | -- | -- | -- | -- | 13 | 28 |
| Philippines | -- | -- | 22 | 57 | 43 | 136 | -- | -- | -- | -- |
| China | 70 | 194 | 74 | 206 | 13 | 34 | 100 | 252 | 18 | 43 |
| Republic of Korea | 452 | 1,929 | 109 | 376 | -- | -- | 95 | 253 | -- | -- |
| Japan | 116 | 475 | 172 | 539 | 450 | 1,361 | 282 | 817 | 76 | 96 |
| Taiwan | 1,113 | 3,140 | 1,759 | 4,752 | 1,483 | 3,981 | 1,530 | 3,982 | 699 | 1,490 |
| Hong Kong | -- | -- | 24 | 81 | -- | -- | -- | -- | -- | -- |
| Micronesia | -- | -- | 5 | 6 | 2 | 7 | -- | -- | -- | -- |
| Vanuatu | 36 | 132 | -- | -- | -- | -- | -- | -- | -- | -- |
| Australia | -- | -- | -- | -- | negl. | 1 | -- | -- | -- | -- |
| French Polynesia | -- | -- | -- | -- | 4 | 12 | 6 | 18 | -- | -- |
| U.S. Pacific Islands | -- | -- | -- | -- | 14 | 44 | -- | -- | -- | -- |
| **Total** | 2,270 | 7,009 | 3,385 | 8,924 | 2,888 | 7,899 | 3,177 | 8,376 | 1,885 | 4,009 |

Source: Eurostat data

Appendix 15. European Union frozen swordfish fillet imports from Asia, 1991-95, by quantity and value.

| Country | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val |
| | *Metric tons/US$1,000* | | | | | | | | | |
| Sri Lanka | -- | -- | -- | -- | -- | -- | -- | -- | 3 | 10 |
| Malaysia | 1 | 1 | -- | -- | -- | -- | -- | -- | -- | -- |
| Indonesia | -- | -- | -- | -- | 3 | 12 | 20 | 76 | 47 | 153 |
| Singapore | 16 | 46 | 68 | 249 | 26 | 113 | 37 | 129 | 58 | 207 |
| Philippines | -- | -- | -- | -- | negl | 1 | -- | -- | -- | -- |
| China | 17 | 62 | -- | -- | 12 | 51 | -- | -- | -- | -- |
| Taiwan | 24 | 77 | 72 | 258 | 33 | 125 | 25 | 77 | 24 | 73 |
| New Zealand | -- | -- | -- | -- | -- | -- | 7 | 18 | -- | -- |
| French Polynesia | -- | --- | -- | -- | -- | -- | negl | 2 | -- | -- |
| **Total** | 58 | 186 | 140 | 507 | 74 | 302 | 89 | 302 | 132 | 443 |

Source: Eurostat data

Appendix 16. European Union frozen swordfish meat imports from Asia, 1991-95, by quantity and value.

| Country | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val |
| | *Metric tons/US$1,000* | | | | | | | | | |
| Malaysia | 4 | 8 | -- | -- | -- | -- | -- | -- | -- | |
| Singapore | 4 | 14 | 2 | 10 | -- | -- | -- | -- | -- | |
| Indonesia | -- | -- | -- | -- | 3 | 12 | 13 | 37 | negl. | 1 |
| Taiwan | 9 | 36 | -- | -- | 14 | 60 | -- | -- | 14 | 11 |
| Thailand | -- | -- | 2 | 4 | -- | -- | -- | -- | -- | -- |
| Sri Lanka | -- | -- | -- | -- | -- | -- | negl. | 1 | 1 | 1 |
| **Total** | 17 | 58 | 4 | 14 | 17 | 72 | 13 | 38 | 15 | 13 |

Source: Eurostat data

Appendix 17. United States. Fresh swordfish imports from Asia, 1991-95, by quantity and value.

| Country | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val |
| | *Metric tons/US$1,000* | | | | | | | | | |
| Australia | -- | -- | -- | -- | 1 | 3 | 1 | 4 | 1 | 4 |
| Cook Islands | -- | -- | -- | -- | -- | -- | 0.3 | 1 | -- | -- |
| FSM | -- | -- | -- | -- | -- | -- | 2 | 6 | 1 | 4 |
| Fiji | 5 | 31 | 6 | 35 | 4 | 18 | 58 | 246 | 213 | 778 |
| French Polynesia | -- | -- | -- | -- | -- | -- | 1 | 2 | -- | -- |
| Indonesia | 1 | 5 | 1 | 7 | -- | -- | -- | -- | -- | -- |
| Japan | -- | -- | -- | -- | 0.3 | 6 | 1 | 4 | -- | -- |
| Malaysia | 1 | 3 | -- | -- | -- | -- | -- | -- | -- | -- |
| Marshall Islands | 1 | 7 | -- | -- | -- | -- | -- | -- | 1 | 6 |
| New Zealand | -- | -- | -- | -- | 17 | 57 | 28 | 145 | 7 | 33 |
| Singapore | -- | -- | 80 | 588 | -- | -- | -- | -- | -- | -- |
| Sri Lanka | -- | -- | -- | -- | 1 | 5 | -- | -- | 2 | 21 |
| Taiwan | 51 | 331 | 112 | 734 | 9 | 67 | 8 | 34 | 6 | 37 |
| **Total** | 59 | 377 | 199 | 1364 | 32.3 | 156 | 99.3 | 442 | 231 | 883 |

Source: U.S. Bureau of the Census

Appendix 18. United States. Frozen swordfish imports from Asia, 1991-95, by quantity and value.

| Country | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val |
| *Metric tons/US$1,000* | | | | | | | | | | |
| China | -- | -- | -- | -- | -- | -- | 3 | 11 | 46 | 99 |
| FSM | -- | -- | -- | -- | -- | -- | 1 | 3 | -- | -- |
| Hong Kong | 2 | 4 | -- | -- | -- | -- | -- | -- | -- | -- |
| Indonesia | 10 | 58 | -- | -- | -- | -- | -- | -- | 7 | 38 |
| Japan | 31 | 231 | 222 | 2,284 | 129 | 1,402 | 183 | 1,807 | 140 | 1,363 |
| Malaysia | 1 | 4 | -- | -- | -- | -- | -- | -- | -- | -- |
| New Zealand | 7 | 39 | -- | -- | -- | -- | -- | -- | -- | -- |
| Philippines | -- | -- | 17 | 61 | 10 | 57 | -- | -- | -- | -- |
| Singapore | 45 | 319 | 114 | 885 | 68 | 396 | 92 | 487 | 52 | 330 |
| Republic of Korea | 1 | 2 | -- | -- | -- | -- | -- | -- | 2 | 5 |
| Taiwan | 37 | 233 | 2 | 8 | 198 | 962 | 239 | 1,064 | 57 | 245 |
| Thailand | 19 | 34 | 9 | 24 | 4 | 19 | 10 | 70 | 12 | 65 |
| **Total** | 153 | 924 | 364 | 3,262 | 409 | 2,836 | 528 | 3,442 | 316 | 2,145 |

Source: U.S. Bureau of the Census

# Japan

The tuna/billfish fishery is one of Japan's largest and most valuable, with distant-water longlining the most significant tuna/billfish fishery, posting a total catch value of approximately $2 billion in 1993.[1] The number of Japanese longliners has decreased gradually as this industry increasingly employs larger vessel sizes which are more profitable, especially for distant-water operations. Japan is the leading catcher of swordfish among Asian longliner fishing fleets, with landings totalling between 20,000 and 22,000 t each year between 1992 and 1994. Most of this catch takes place in Pacific Ocean fisheries, but a significant amount of swordfish is also caught in Atlantic Ocean fisheries. Swordfish is targeted for capture in coastal Japanese longliner fisheries, but is caught incidentally in distant-water longliner fisheries.

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## I. Fleet

### History of Distant-water Longliner Fishery

**Pre-war:** The Japanese longliner fishery dates back to the Meiji Era (1868-1912). Enactment of the Distant Water Fisheries Promotion Act in 1897 and other fisheries legislation in 1901 provided the policy foundation for the initiation of longline fisheries. New technological developments such as engines, line haulers, refrigeration, and radios allowed longliners to fish farther offshore. Between 1922 and 1935, the government subsidized fishing vessel construction, and provided grants for tuna fisheries development. The Fisheries Promotion Act was revised in 1935 to provide coordination of all factors relevant to distant-water longlining (e.g. ice making, cold storage, freezer carriers). Japan had installed engines in almost all longliners by 1926, and mothership operations were conducted in the Dutch East Indies (Indonesia) between 1932 and 1933. There were 72 Japanese longliners with a capacity ranging from 60 to 270-GRT operating in the western central Pacific by 1939. Total catch of all species increased steadily from 14,300 t in 1894 to over 86,000 t in 1940, just before the outbreak of World War II.

**Post-war**: By 1945, Japanese tuna catch decreased to just over 12,000 tons. Since food production was one of the post-war Government's top priorities, it promoted the expansion of distant-water fisheries. A series of boundary lines (so-called "MacArthur lines") were established that allowed the gradual expansion of Japanese distant-water fishing eastward to 180 degrees and south to the equator, between the years 1945 and 1950. The last MacArthur line was abolished in 1952, allowing Japanese tuna longliners access to fisheries around the world. By the mid-1960s, Japanese longliners were fishing off South America, West Africa, the Indian Ocean, and south of Australia. Longliner catch of all species increased rapidly from 15,000 t in 1946 to over 450,000 t in 1963.[2] Overall longliner catch decreased gradually between 1964 to 1980, when total catch was approximately 340,000 tons. Between 1980 and 1989, catches continued to decrease, reaching a low of just under 255,000 tons in 1989. Since 1989, catches increased again and reached nearly 306,000 t in 1993.

The number of Japanese distant-water tuna longliners has been decreasing gradually over the years, from 1,171 in 1980 to 743 in 1995 (appendix 1, figure 1). Approximately 90 percent of these vessels are over 200GRT with the remaining vessels between 100 and

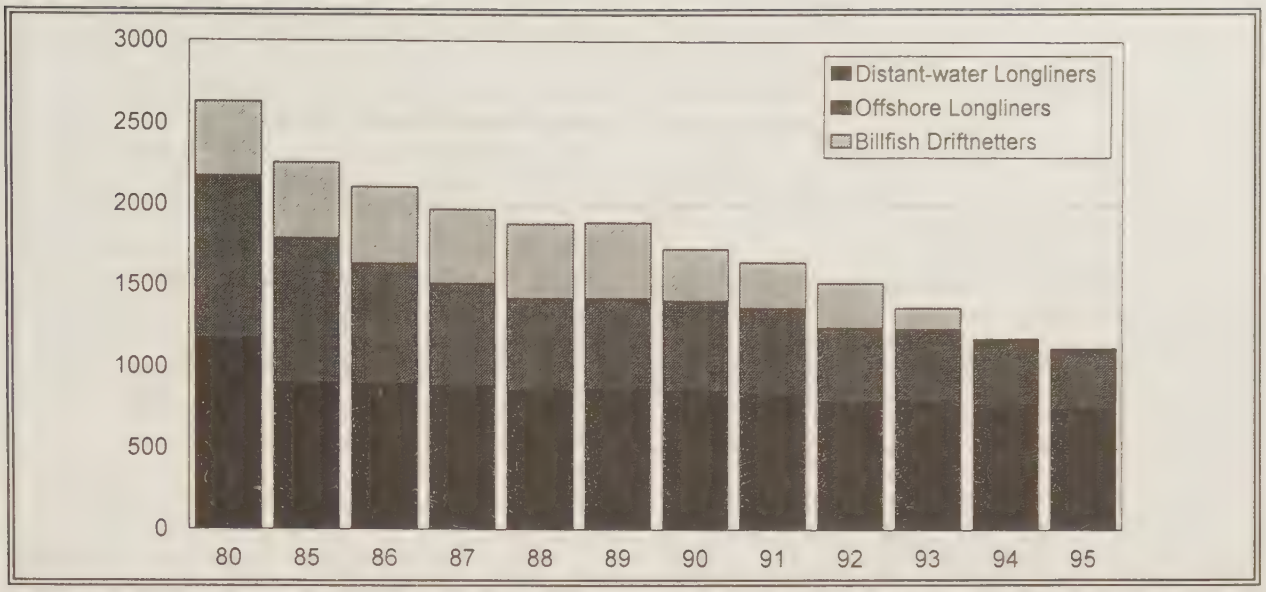


**Figure 1**--Japan. Number of licensed tuna/billfish vessels for designated fisheries, 1980, 1985-95. Source: Fisheries Agency of Japan.

200GRT (appendix 2). With regard to the Indian Ocean, the vast majority of Japanese longliners are between 200-500-GRT, with a small number of 50-200-GRT vessels (appendix 3). The number of vessels operating in this fishery has generally declined, moving from a high of 319 vessels in 1985 to the 1993 figure of 189 vessels. In the Atlantic Ocean, The number of longliners deployed in this fishery has fluctuated between 235 vessels and 307 vessels between 1989 and 1994 (appendix 3). Vessel size ranges between 300-400 GRT with a crew size of approximately 20 persons.[3]

The downward trend in the number of distant-water tuna longliners is likely to continue since Japanese labor is scarce and increasingly expensive, and this sector comes to be dominated by developing Asian competitors with cheap and abundant labor (e.g. China and Indonesia). An analysis of the profitability of Japanese tuna longlining between 1987 and 1991 indicates that this fleet was marginally profitable between 1987 and 1990, but was extremely unprofitable in 1991 (appendix 4).

As with the distant-water longliner fleet, the **offshore longliner** fleet is gradually decreasing. There were a total of 637 offshore longliners in 1980 but the number of longliners has decreased almost every year since then, numbering just 255 vessels in 1994. Vessels in this fishery are classified by the Japanese Government as being above or below 50 GRT with almost all longliners in this fleet being in the 50 GRT and above category (appendix 5).

In comparison with the distant-water and offshore longliner fleets, the Japanese **coastal longliner** fleet has remained fairly stable in size. The fleet numbered 821 vessels in 1980, decreased to a low of 536 vessels in 1986, and has since then increased to the 1994 vessel total of 819 (appendix 6). The vessels in this fleet are classified by the Japanese Government in the following three categories: up to 5 GRT, between 5-10 GRT, and above 10 GRT. The majority of the vessels in this fleet are in the above 10 GRT category.

**Longliner construction**: Despite the availability of low-interest government loans, an analysis of fisheries-related shipbuilding points to an industry in decline. Large shipyards which build not only fishing vessels, but also oil tankers and passenger/cargo vessels, have not been as hard hit by the reduced demand for fishing vessels.[4] Smaller Japanese shipyards which primarily build fishing vessels, however, have been severely impacted.[5] The number of shipyards building fishing vessels has been halved during the 1980s, falling from 58 in 1980 to just 23 in 1991.

Reflecting this decline, the number of new longliners built decreased from 230 vessels in 1980 to just 26 vessels in 1994 (appendix 7). Demand for new fishing vessels has been dampened by depressed fish prices, the increased cost of new vessels, and a shortage of fishing labor. It should be noted, however, that the average cost for 379-ton tuna longliners has stabilized and actually decreased in 1994 (appendix 8). With a continued bleak outlook, fishing vessel builders are starting to explore conversion to other

types of shipbuilding, such as the construction of coastal shipping vessels.[6] The specifications of typical Japanese tuna vessels, including longliners, are listed in appendix 9. Major Japanese shipbuilders of tuna longliners are provided in appendix 10.

**Other Fishing Methods**

**Drift Gillnet Fleet:** Japan formerly conducted high-seas driftnet fisheries for tuna and billfish in the North Pacific Ocean, and for albacore tuna in the South Pacific. In addition, the Japanese coastal driftnet fleet targets striped marlin, with additional catches of yellowfin tuna, skipjack, swordfish, and other species. This fleet operates off northern Honshu from July to October. Driftnet vessels deploy multi filament gear which measures approximately 9 m deep and has a mesh size of 18 centimeters (cm). Sets are usually made in the afternoon, allowed to drift at night, and retrieved before dawn.[7]

The number of registered vessels in this fishery peaked at 468 in 1989 and declined in subsequent years to just 123 vessels in 1994 (appendix 11--Note: In compliance with the United Nations Resolution, no Japanese large-mesh billfish driftnet vessels have operated on the high seas since 1992). The Japanese Government classifies vessels in this fleet in three categories: 5 GRT or less, 5-10 GRT, and over 10 GRT. The vast majority of this fleet is composed of vessels over 10 GRT.

In the wake of United Nations General Assembly Resolution 46/215, which declared a moratorium on high-seas pelagic driftnet fisheries effective on January 1, 1993, the Japanese high-seas driftnet fleet ceased its activity. The Japanese Government implemented a plan to accommodate Japanese fishermen affected by the high-seas driftnet ban. The Japanese Government offered compensation to owners of high-seas large-mesh driftnet vessels (used primarily in the tuna/billfish fishery) for one year (1992). Large-mesh driftnet vessel owners who retired their vessels in 1992 were eligible for compensation in the range of $500,000-870,000, depending on vessel tonnage.[8]

**Harpoon Fleet:** The Japanese harpoon fishery targets striped marlin, with blue marlin and swordfish also caught occasionally. Oceanographic conditions associated with the Kuroshio current play a great role in determining the fishing season since fishing with harpoons requires calm seas to sight the fish and position the vessel. This fishery takes place in the Bonin and Izu Islands south of Tokyo and off the northern coast of Honshu, typically from December to May. The fleet consists of approximately 100 vessels which mainly range from 3 to 15 GRT. The harpoons, usually five m in length and four cm in diameter, are tipped with a three pronged electric dart. After fish are sighted from the crow's nest, the vessel moves to the target and the harpooner throws the harpoon by hand. The electric darts are employed to deliver a lethal shock to the fish. Catch of swordfish in this fishery ranged from a high of 1,700 t in 1970 to a low of approximately 100 t in 1986. The decrease in harpoon catch corresponds directly with increased driftnet catch, indicating it competes directly with the driftnet fishery.[9] It is unclear whether this fleet continues to fish since no information is available in current Japanese Government fishery statistics.

**Vessel Exports**

As fishing has become less and less profitable for Japanese fishing companies, a significant number of fishing vessels have been exported to foreign countries. Although many countries have purchased Japanese fishing vessels, the most noteworthy customers have been China and the flag-of-convenience nations (appendix 12). Between 1985 and 1995, China purchased a total of 130 vessels, averaging 404 GRT. A good number of these vessels are probably stern factory trawlers engaged in distant-water operations in the North Pacific and the eastern Atlantic Ocean off West Africa. Among the flag-of-convenience nations, Panama and Honduras purchased the lion's share of used Japanese vessels. Panama has purchased 114 vessels, averaging 341GRT, while Honduras purchased 81 vessels, averaging 306 gross registered tons. The vast majority of these vessels are believed to be distant-water tuna longliners, often owned by Taiwan companies.

The export of aging Japanese distant-water tuna vessels to flag-of-convenience states has become a source of great concern to the Japanese tuna industry. The primary reason for this concern is that the majority of these vessels are thought to be tuna longliners which catch a considerable amount of *sashimi*-grade tuna that is exported to the Japanese market. These exports depress the potentially lucrative Japanese *sashimi* market by lowering tuna prices. The Japanese tuna industry estimates that approximately 200 reflagged tuna vessels are currently fishing, the majority of which are registered in Panama and Honduras (appendix 13). Department of Defense data indicate that many former Japan-flag vessels are now flying foreign flags, the most notable of which are: Panama-58 vessels, Honduras-26 vessels, and St. Vincent-Grenadines-13 vessels.

The Japanese tuna industry estimates that Japanese imports of frozen *sashimi* tuna caught by these reflagged vessels increased from 27,000 t in 1989 to 39,000 t in 1991.[10] This amounts to 11 percent of total Japanese frozen *sashimi* tuna supplies, and 22 percent of frozen *sashimi* tuna imports. Since the traditional four suppliers of frozen tuna *sashimi* (Japan, the ROK, Taiwan, and Indonesia) provide 88 percent of the total supply, it is thought that the remaining supply consists almost entirely of flag-of-convenience vessel-caught product. The Japanese tuna industry speculates that the majority of the reflagged vessels are managed by ROK, Japanese, and Taiwan companies.

To combat this trend, the major Japanese tuna industry organization, Japan Tuna (known in Japanese as NIKKATSUREN), has established a $9 million fund to compensate Japanese tuna vessel owners who scrap rather than export their aging vessels. Japan Tuna is also addressing the questions of tuna oversupply and flag-of-convenience registration in bilateral private-level meetings with the ROK and Taiwan, and in quadripartite meetings with the ROK, Taiwan, and Indonesia.[11]

**Fleet Supplies**

**Domestic fuel supplies**: The provision of fuel supplies for tuna fishing fleets was initiated by the Japanese tuna industry at major Japanese ports in 1959. Japan Tuna has established a nationwide network of 37 agents at 33 ports, with fuel storage facilities at the major ports of Yaizu, Shimizu, and Misaki. In addition, a number of fuel tanks are leased to stock fuel at several other ports. Japan Tuna operates two barges, *Sun-en Maru No. 3* and *Miura Maru No.3* (both 200 kiloliter capacity) on a charter basis. Japan Tuna fuel tanks are described in Table 1.

Table 1–Japan Tuna fuel tanks.

| Depot | Location | Number of Tanks | Total Tank Capacity (kiloliters) |
|---|---|---|---|
| Misaki | Kanagawa Prefecture | 3 | 2300 |
| Shimizu | Shizuoka Prefecture | 3 | 3080 |
| Yaizu | Shizuoka Prefecture | 3 | 1750 |
| Total | | 9 | 7130 |

Source: "Japan Tuna 1994," Japan Fed. of Tuna Fisheries Coop. Assoc.

**Overseas fuel supplies**: The Japanese distant-water tuna/billfish fishing industry began overseas supply operations in Singapore and Sri Lanka in 1956. A world-wide supply network, coordinated by the Japan Tuna industry organization, consists of 10 affiliated/associated companies, 6 resident representatives' offices, and 93 shipping agents. A major development was the establishment of the Japan Tuna (Panama) Corporation in March 1972, the first shipping agent wholly owned by Japan Tuna. Following this, similar operations were established in Australia, New Zealand, and South Africa. Japan Tuna also initiated a vessel maintenance service in 1990 whereby a team of expert engineers is sent to repair Japanese vessels tied up in foreign ports. Table 2 summarizes fuel services supplied at overseas ports by Japan Tuna.

Table 2–Japan Tuna fuel services.

| Item | Fiscal Year 1991 | Fiscal Year 1992 | Fiscal Year 1993 |
|---|---|---|---|
| Number of Ships Supplied | 1,780 | 2,478 | 1,772 |
| Volume of Fuel Supplied (metric tons) | 190,846 | 206,762 | 204,174 |

Source: "Japan Tuna 1994," Japan Fed. of Tuna Fish. Coop. Assoc.

**At-sea supplies**: Japan Tuna initiated an at-sea supply service in 1963, providing fuel, food, and other necessities to the Japanese distant-water longliner fleet. A tanker, remodeled for this purpose , was chartered from the Ueno Unyu Company. A medical clinic was constructed on this tanker in 1965, enabling it to provide medical services to the crew of distant-water longliners. This tanker was replaced in 1972 by the M/V *Japan Tuna*, specially built to supply goods and services at sea. The M/V *Japan Tuna No. 2* was launched in 1979 to provide at sea service from its home base of Balboa, Panama. Operation of these "motherships" was handed over to the Japan Tuna Ocean Supplies Corporation in 1981. The *Japan Tuna* was sold in 1983 and the *Japan Tuna No.3* was launched in 1992. A summary of the services provided by the Japanese motherships is described in Table 3.

Table 3–Japan Tuna at-sea supply services.

| Activity | Fiscal Year 1991 | Fiscal Year 1992 | Fiscal Year 1993 |
|---|---|---|---|
| Number of Vessels Supplied | 826 | 833 | 665 |
| Fuel Supplied (kiloliters) | 104,016 | 106,820 | 84,081 |
| Number of Patients Treated | 1,334 | 963 | 826 |

Source: "Japan Tuna 1994," Japan Federation of Tuna Fisheries Cooperative Associations.

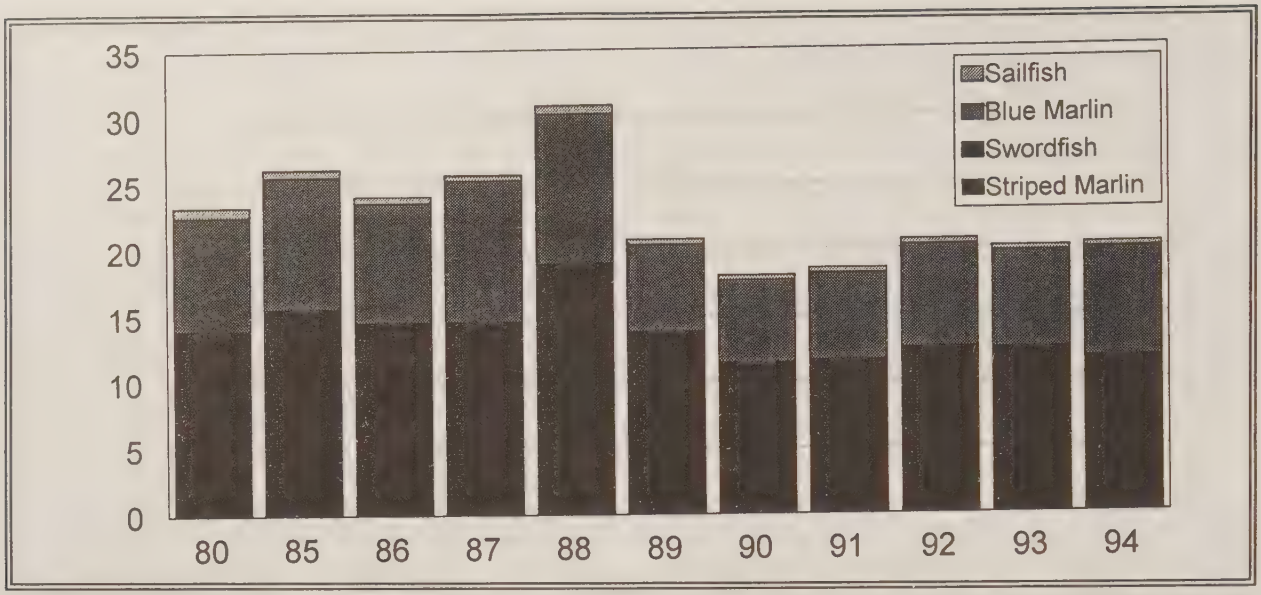


**Figure 2**--Japanese distant-water billfish longliner catch, by species and quantity (metric tons, thousands), 1980, 1985-94. Source: Japanese Ministry of Agriculture, Forestry, and Fisheries.

**Bait supply services**: Japan Tuna first provided squid bait to vessels fishing out of Las Palmas, Canary Islands, in 1970 on a spot basis. Since then, Japan Tuna has established regular bait supply services. The main sources of bait supply in fiscal year 1993 were: Cape Town (2,526 t), Callao (1,746 t), Las Palmas (1,562 t), Japanese ports (2,918 t), *Japan Tuna No. 2* (220 t).

**Spare parts delivery services**: Upon request, spare vessel parts are sent via airfreight to member vessels tied up in foreign ports. Japan Tuna delivered a total of 2,910 such spare parts during Japan fiscal year 1993.

## II. Catch

**Overall:** Japan's overall fisheries catch has decreased dramatically from 12.8 million t in 1988, to just over 8.0 million t in 1994 (appendix 14). This decrease is also seen in overall distant-water catch which peaked at 2.3 million t in 1987, but totaled just 1.1 million t in 1994.

**Tuna Longliners (Overall)**: An analysis of tuna longliner catch trends, however, reveals mixed trends. Distant-water tuna longliners overall catch fluctuated between 169,000 t and 233,000 t between 1985 and 1994. Catch increased in this fishery between 1990-93, but decreased in 1994 (appendix 15). Off-shore longliner catch has decreased generally since 1980, falling from 106,000 t to a low point of 48,000 t in 1994. Coastal longliners' overall catch increased from 23,000 t in 1980 to a high of 42,000 t in 1993, but decreased to 39,000 t in 1994.

**Overall Billfish Catch**: Overall Japanese billfish catch has fluctuated between 32,000 and 37,000 t since 1989 (appendix 16). Swordfish and blue marlin are the two primary species caught, with swordfish comprising between 40 and 43 percent of overall billfish catch since 1989. Over 90 percent of the billfish are caught by tuna longliners, with nominal catches by driftnet/gillnet, trapnet, and other methods (including harpoon)(appendix 17).

**Longliner Billfish Catch**: Distant-water longliner billfish catch has fluctuated between 18,000 and 21,000 t since 1989(appendix 18, figure 2). Swordfish comprises between 39 and 46 percent of the overall catch and has ranged between 8,000 and 8,800 t during this time frame. Off-shore longliner billfish catch has a higher swordfish composition, ranging between 49 and 60 percent between 1989 and 1994 (appendix 19). Overall billfish and swordfish catches for this fleet have fluctuated since 1989. Coastal longliner overall billfish catch increased markedly between 1990-93, from 3,100 to 5,400 tons. Catch in 1994, however, decreased to 4,700 tons. Swordfish has comprised between 21 to 29 percent of the total billfish catch since 1987 (appendix 20).

**Driftnet Billfish Catch**: Only limited information about this fishery is available (appendix 21). This information indicates billfish comprised between 14 and 65 percent of

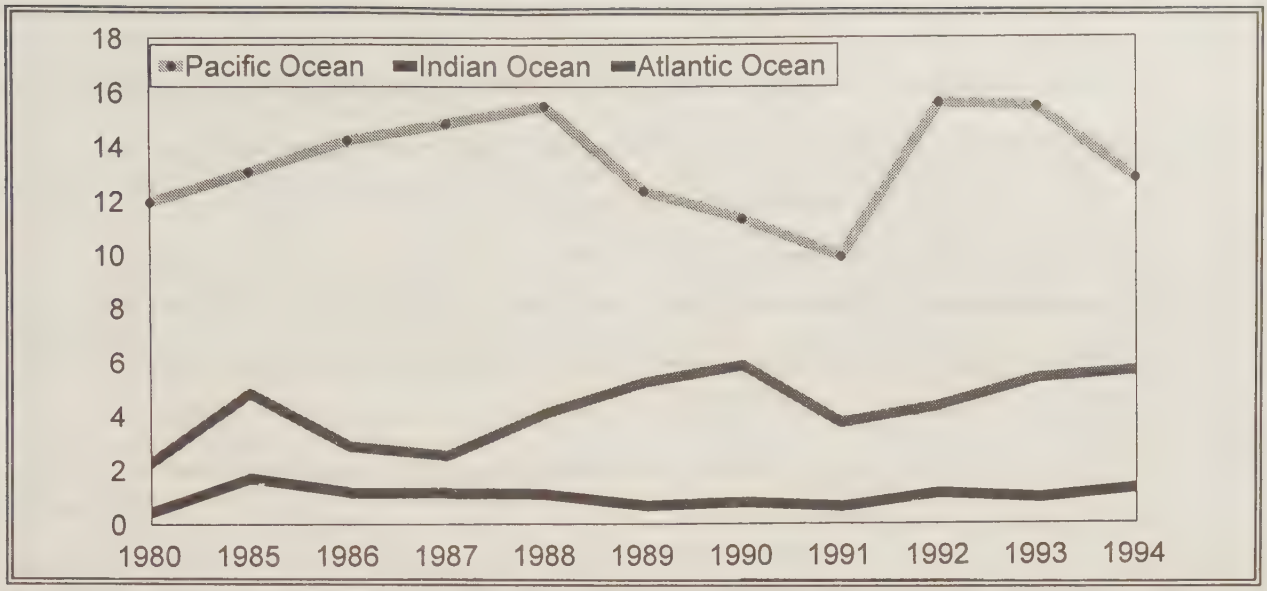


**Figure 3**--Japanese swordfish catch, by major FAO fishing area and quantity (metrics tons, thousands), 1980, 1985-94. Source: FAO.

the total catch between 1990-94. No breakdown for swordfish is available.

**Catch by Ocean**

Due to the highly migratory nature of tuna and billfish, fishing grounds for these species occur throughout the world's oceans. Overall trends for Japanese swordfish catch broken down by ocean are indicated in figure 3.

**Indian Ocean:** Japanese longlining began in the eastern equatorial Indian Ocean in 1952, and rapidly expanded to cover all tropical Indian Ocean waters by the early 1960s. During the mid-1970s, Japanese longliners shifted their effort from tropical waters where albacore and yellowfin tuna used for canning are found, to temperate waters where high-value *sashimi* species such as bigeye and southern bluefin tuna dwell.[12]

Overall catch for the Japanese longliner fleet in the Indian Ocean has been decreasing since peaking in 1990 at 23,000 t (appendix 22). Billfish catch figures also indicate a generally decreasing trend. Billfish catch peaked at around 5,000 t in 1985, but totaled just 1,277 t in 1993. Swordfish catches have also decreased, from 1,665 t in 1985 to 882 t in 1993. More billfish has been caught in the western than the eastern Indian Ocean and the swordfish catch composition has also tended to be higher in the western Indian Ocean (appendices 23 and 24).

**Pacific Ocean:** Catch rates from the Japanese tuna longline fishery indicate swordfish catch has been concentrated in three areas of the Pacific Ocean: the central North Pacific, the eastern tropical Pacific, and the western South Pacific.[13]

**1960s**: Japanese longlining in the Pacific Ocean was concentrated in three areas: 1) the high latitudes of the southern hemisphere near Australia and New Zealand for southern bluefin tuna, 2) temperate and tropical waters of the central and western Pacific for yellowfin and bigeye tuna, and 3) waters off Mexico for striped marlin.

**1970/80s**: Fishing effort in coastal Mexican waters decreased substantially by 1975. Effort increased markedly in the equatorial region of the central and eastern Pacific thanks to successful deep longliner operations targeting bigeye tuna. It is estimated that deep longlining comprised 90 percent of all longlining operations in this fishery in 1985.[14]

It is difficult to assess trends in the Japanese distant-water longliner fleet operating in the Pacific Ocean due to a lack of comprehensive information on this fleet from a single source. Information submitted to the South Pacific Commission indicates that longliner catch in the South Pacific region has fluctuated since 1989 (appendix 25). Overall catch has fluctuated between 43,000 t and 69,000 t since 1989, while catch of "other" species (presumably including billfish and swordfish) has fluctuated between 5,800 t to 10,600 t during the same time frame. Data

submitted to the FAO indicate that Japanese swordfish catch is concentrated in Areas 61 (largely around Japan), 77 (East Central Pacific), 81 (Southwestern Pacific), with lesser catches in Areas 71 (West Central Pacific) and 87 (Southeastern Pacific)(appendix 28).

**Atlantic Ocean:** Japanese longlining began in the Atlantic during 1952, and has taken place in the Mediterranean since 1972. The catch of bigeye tuna has accounted for approximately 70 percent of this fishery's total catch since the mid-1980s. Swordfish has been a significant bycatch in this fishery, comprising over 10 percent of this fishery's catch in 1994 (appendix 26). The vast majority of swordfish is caught in Atlantic, rather than Mediterranean fishing grounds.

Catch figures for the Japanese longliner fleet operating in the Atlantic Ocean indicate catches fluctuating between 47,000 and 59,000 t between 1989 and 1994 (appendix 26). Billfish catch has been consistent with this overall fluctuating trend. Swordfish catches have ranged from 7,300 t in 1990 to 3,500 t in 1992. Catches have been at higher levels, however, in 1993 and 1994. Swordfish comprises a very high percentage of the Japanese longliner billfish catch in the Atlantic Ocean, ranging between 77 and 87 percent of the total between 1980 and 1994 (appendix 27). In the Mediterranean, almost all the fish caught are bluefin tuna, with swordfish comprising just 1 to 4 tons of the annual catch.

Japanese swordfish catch in the Atlantic reported to the FAO has been largely concentrated in two FAO areas; Area 34 (East Central Atlantic) and Area 47 (Southeastern Atlantic)--with notable catches also taking place in Area 41 (Southwestern Atlantic) (appendix 28). Swordfish catch trends in these two areas have been inconsistent during the 1980-94 time frame, with total catches for Area 34 ranging from 700 to 2,300 t; and from 900 to 3,000 t for Area 47. Catch in Area 41 ranged from a low of 136 t in 1980 to a high of 1,253 t in 1990.

## III. Ports

The Japanese tuna/billfish longliner industry operates out of ports all over the world. Most Japanese coastal and offshore longliners are based in the main island of Honshu, with the most important ports being Kesennuma (Miyagi Prefecture), Misaki (Kanagawa Prefecture), Shimizu (Shizuoka Prefecture), and Yaizu (Shizuoka Prefecture). Longliners are also based in Kyushu, Shikoku, Hokkaido, and Okinawa (see Map). Total billfish landings at principal Japanese ports totaled 26,065 t, or approximately two-thirds of the total 1993 billfish catch of 35,939 (appendix 29). Swordfish landings at these ports totaled 11,072 t, divided between fresh (6,500 t) and frozen (4,572) product. Fresh landings were mainly at Kesenuma whereas frozen landings took place largely at Misaki and Shimizu.

The Japanese tuna industry has representative offices in almost all major fishing ports around the world, most notably in Panama, Australia, New Zealand, South Africa, the United States, Singapore, Peru, and Spain (Canary Islands).

## IV. Transshipments

According to both the Fisheries Agency of Japan (FAJ) and the Federation of Japan Tuna Fisheries Cooperative Associations (NIKKATSUREN), there has been no transshipment of swordfish or tuna at sea or in foreign ports for exports. Each transshipment of the catch is subject to FAJ approval and transshipment has taken place occasionally. However, all Japanese transshipment is for transport of the catch back to Japan and is not destined for export markets.[15]

## V. Processing

Kesennuma, Miyagi Prefecture (Northeastern Honshu), is the largest receiving port of fresh round billfish from coastal and offshore tuna longliners. All fresh billfish is cut into chunks and sold as *sashimi* to supermarket chains or institutional users in Japan. On the other hand, such ports as Misaki and Shimizu (southwest of Tokyo) receive billfish which has been gilled, gutted, and frozen aboard distant-water tuna longliners. Except for blue marlin, which is exported, the billfish is consumed in the domestic Japanese market: swordfish for *teriyaki* (broiled with sweet soy sauce); striped marlin for *sashimi*; and black marlin for *kasuzuke* (pickled in *sake* lees). In both Misaki and Shimizu, there are only 2 or 3 billfish processors. Since it is generally not easy to locate billfish processors in Japan, frozen billfish is sometimes delivered by truck from these ports to Kyushu or some other cities of Japan for processing.[16]

Japanese statistics indicate the amount of swordfish processed at-sea between 1989 and 1994 has remained stable at between 9,000 and 10,000 tons (appendix 30).

Corresponding figures for on-shore processing do not specify beyond the billfish category but this figure has declined from a high of almost 4,000 t in 1990 to a low of approximately 2,500 t in 1993 and 1994.

## VI. Companies

The Japanese tuna fishing industry is comprised largely of small and medium-sized companies that are scattered throughout the Japanese archipelago. The companies have formed local tuna fishing cooperative associations on a prefectural level, with Japan Tuna being the central Japanese tuna cooperative association (known as NIKKATSUREN in Japanese). The larger fishing companies which are not eligible to join a cooperative association are organized separately under the Japan Tuna Fisheries Association (JTFA). The JTFA and Japan Tuna, created in 1950, share the same objectives as well as the same Executive Board and full-time directors. As of April 1994, Japan Tuna and JTFA were comprised of a total of 19 member organizations and 351 enterprises.[17]

The activities of Japan Tuna include the following: supplying fuel oil and bait; transporting, storing, processing, and marketing catch; operating fishing bases; educating and training members; and arranging for foreign crew on member vessels. Japan Tuna has an International Division which is primarily concerned with securing and maintaining foreign fishing grounds, establishing and maintaining bilateral fishery agreements, gathering information on foreign fishery industries, and addressing the international control and conservation of fisheries. A list of Japanese tuna industry associations is provided in appendix 31.

## VII. Domestic Consumption

Japan's growing post-war economy was accompanied by higher demand for *sashimi*-quality tuna, thus encouraging rapid growth in Japan's distant-water tuna fisheries. Following U.S. nuclear weapons testing in the South Pacific in 1954, however, Japanese tuna caught in central Pacific fishing grounds was found to be contaminated, resulting in a collapse of the Japanese tuna market. The Japanese tuna industry reacted by introducing new tuna products, such as sausages and hams, which used non-contaminated billfish as tuna substitutes. Species such as black marlin and blue marlin became near-perfect substitutes for tuna at this time in the Japanese market. When the tuna market recovered in the early 1960s, Japanese consumers viewed billfish as a type of tuna and the billfish market began to mature.[18]

Beginning in the late 1960s, some Japanese longliners acquired the technology to deep-freeze catches, allowing high-quality tuna and billfish to reach Japan from distant-water fishing grounds. This development resulted in lower *sashimi* prices and higher consumption of tuna and billfish. Billfish was also found to experience less discoloration and higher quality than most tuna caught and transported in this manner. At this time, billfish became a popular species for *sashimi* and *sushi*.

Striped marlin was the billfish species of choice by the mid-70s, commanding higher prices in Japan than all tuna species except bluefin tuna. With the exception of small spearfish, billfish was used exclusively in high-end *sashimi* markets rather than processed fishery markets. Increased tuna supplies since the 1970s have not adversely affected billfish demand, with billfish species establishing their own market niches distinguishable from tuna markets.

Billfish are handled, sold, and consumed in Japan in a manner similar to tuna. In the mid-1980s, dockside billfish prices at the Yaizu market exceeded those for most species (bluefin tuna being a notable exception). Between 1985 and 1995, the average swordfish market price was significantly lower than those for bluefin and bigeye tuna, but was generally equal to, and sometimes greater than, those received for yellowfin tuna (appendices 32-35). It is interesting to note that prices for bluefin, bigeye, and yellowfin tuna during January-October 1995 decreased significantly from 1994 levels, however, prices for swordfish increased slightly.

Species-specific data for swordfish consumption are unavailable, but consumption data for tunas indicate a general increase from 2.9 kilograms (kg) per household in 1989 to 3.3 kg in 1993.[19]

## VIII. Exports

From an historical standpoint, fisheries products as a whole were an important export item for Japan between 1955 and 1965, comprising more than 5 percent of the total value of Japanese exports. In those days, frozen tuna was exported to the U.S. and canned tuna was shipped to Europe. There was a Frozen Fishery Products Exporters Association with a membership of 209 companies,

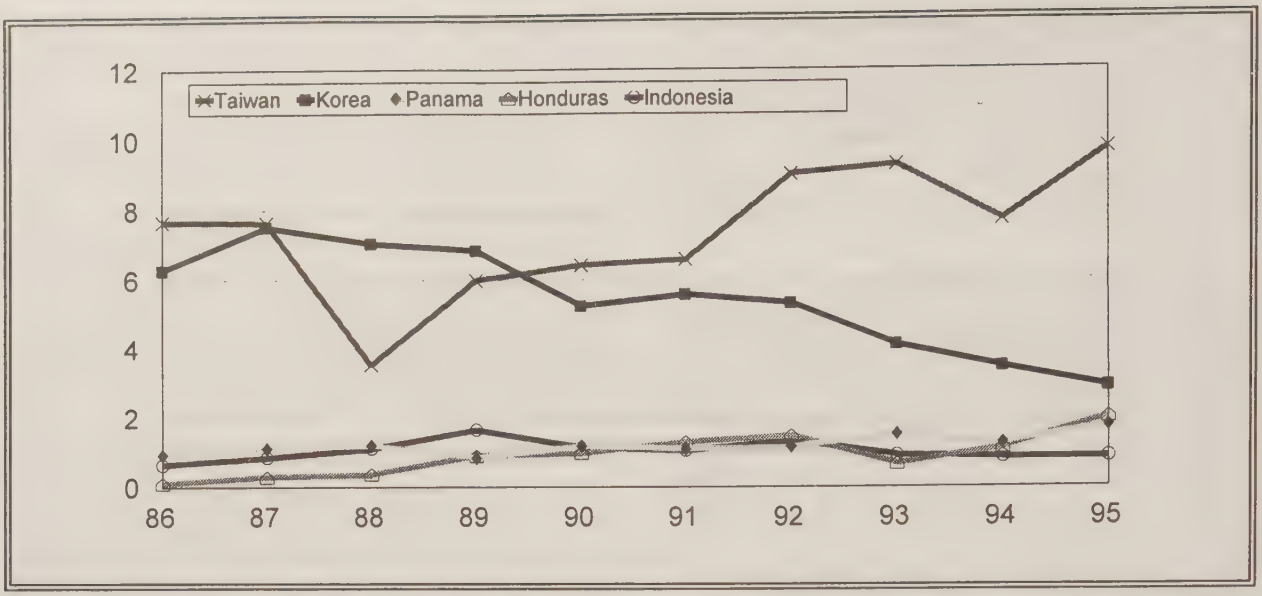


**Figure 4**--Japanese imports of billfish (including swordfish), by year, quantity (metric tons, thousands), and value, 1986-95. Source: Japan Marine Products Importers Association.

Association with a membership of 209 companies, primarily exporting frozen tuna and skipjack. Times have changed though. Due to rising wage levels, higher domestic income levels and demand, and the appreciation of the yen, Japan is now a net importer of tuna which is no longer a major foreign exchange earner. In 1994, the membership of the aforementioned Exporters Association declined to 26 companies and the Association was dissolved. Japanese exports of frozen billfish totaled only $4.1 million in 1994 and $1.1 million in the first four months of 1995.

Looking at exports to the two major foreign markets, the European Union (EU) and the United States, one sees the following. With regard to the **EU**, exports have been limited to frozen swordfish. Japan exported a high of 450 t valued at $1.4 million in 1993, and exported between 76 and 282 t during the other three years of the time frame (Overview chapter, appendix 14).

Exports to the **United States** have largely consisted of frozen swordfish, with a negligible quantity of fresh product shipped in 1993 and 1994 (Overview chapter, appendices 17 and 18). U.S. imports of Japanese frozen swordfish have ranged between 129 and 222 t between 1992-94. Japan is one of the top 3 exporters to the U.S. frozen swordfish market, along with Singapore and Taiwan.

## IX. Imports

Japanese import statistics do not differentiate swordfish from other billfish species, but general trends can be discerned. Overall Japanese imports of billfish (including swordfish) have fluctuated between 19,500 and 24,000 t between 1985 and 1992, the last year frozen tuna and frozen billfish fillets were grouped together in Japanese trade statistics (appendix 36). Since 1993, annual billfish imports have ranged from 18,400 to 21,500 tons.

Japanese billfish imports are classified into three categories: fresh, frozen, and fillets. As might be expected, the primary exporters of billfish to the Japanese market are also those countries which export a great deal of tuna to Japan (e.g. Taiwan, Korea, Indonesia, Panama) (figure 4).

**Fresh Billfish**: Japanese imports of fresh billfish have been dominated by Taiwan and the Philippines, with lesser quantities imported from Malaysia, Fiji, and the United States (Guam) (appendices 37 and 38). The quantity of imports for this commodity has remained fairly stable since 1985, generally ranging between 1,000 and 2,000 t per year. An increase in fresh billfish imports from Guam is particularly noteworthy, rising from just 40 t in 1992 to 332 t in 1995.

**Frozen Billfish**: In terms of its overall quantity and value, this commodity comprises the largest part of the Japanese billfish market. The primary exporters of this commodity are the major distant-water longlining fleets of Taiwan, Korea, Panama, Indonesia, and Honduras (appendices 39 and 40). In addition, significant quantities are shipped from Singapore, South Africa, Uruguay, Trinidad & Tobago, and St. Vincent. Annual imports of this commodity have fluctuated between 13,500 t and 18,000 t since 1986. Import statistics for 1995 indicate significant increases from Taiwan (up 23 percent) and Singapore (up nearly fourfold).

**Frozen Tuna and Billfish Fillets**: As with the previous commodities, frozen fillets of this product have been shipped to Japan by countries such as Taiwan, Korea, Honduras, Panama, and Indonesia (appendices 41 and 42). Between 1986-92, annual imports ranged from 2,400 t to 5,600 tons. Since 1993, billfish fillets have been counted separately, with annual imports averaging approximately 1,800 t between 1993 and 1995.

## X. Legal Framework

### Government Efforts to Encourage/Discourage Swordfish Fishing

Up to the end of 1992, while large-mesh billfish driftnet vessels were operating on the high seas, the Japanese Government did not provide any specific incentives to promote swordfish fishing. Rather, the Japanese Government, beginning in 1995, has begun restricting bycatch of swordfish, as Fisheries Agency of Japan (FAJ) Oceanic Fisheries Department Councillor Morimoto stated at a bilateral Japan-U.S. Fisheries Consultative Meeting in Tokyo in January 1995, saying that "Japan has made a firm decision to agree to reduce its bycatch rate of swordfish from 10 percent to 8 percent in the International Convention for the Conservation of Atlantic Tunas (ICCAT) area."[20]

### Regulation of Swordfish fishing

Japan is implementing the latest ICCAT recommendations on swordfish, i.e., a MAFF Minister's notification in accordance with the "Fisheries Law of Japan" (Law No. 267 of December 15, 1949, as amended, hereinafter referred to as the Law) reduces the bycatch rate of swordfish from 10 percent to 8 percent in the northern area, and restricts the bycatch of swordfish to the 1993-1994 level in the southern area.

Whereas Inter-American Tropical Tuna Commision (IATTC) restrictions are in effect only on the catch of yellowfin tuna by purse seiners, Japan does not have any domestic swordfish regulations applicable to its fishing vessels.

### Licensing System for Foreign Fishing of Tuna and Swordfish

1) Fishing for 15 highly migratory species of fish, including tuna and swordfish, within the Japanese 200-mile zone by foreign fishermen is subject to a permit issued by the Ministry of Agriculture, Forestry, and Fisheries (MAFF) Minister effective January 1, 1992, by partial amendment to the enforcement order (Cabinet Order No. 212 of June 17, 1977) of the Law on Provisional Measures Relating to the Fishing Zone (The so-called Fishing Zone Law of Japan, Law No. 31 of May 2, 1977).

2) Article 3 of the Enforcement Order (Cabinet Order No. 212 of June 17, 1977) of the Law on Provisional Measures Relating to the Fishing Zone provides that "The Highly Migratory Species Prescribed by a Separate Cabinet Order Provided for in Article 6, Paragraph 1, Subparagraph 1 of The Law Shall Be the Following (listed in Table 4):

Table 4. Japanese highly migratory species.

| Japanese Name | English Name | Scientific Name |
|---|---|---|
| Katsuo | Skipjack | *Katsuwonis pelamis* |
| Suma | Black Skipjack | *Euthynnus affinis yaito* |
| Hirasoda | Frigate Mackerel | *Auxis thazard* |
| Marusoda | Bullet Mackerel | *Auxis tapeinosoma* |
| Binnaga | Albacore | *Thunnus alalunga* |
| Kihada | Yellowfin Tuna | *Thunnus albacares* |
| Kuromaguro | Bluefin Tuna | *Thunnus thynnus* |
| Mebachi | Bigeye Tuna | *Thunnus obesus* |
| Koshinaga | Longtail Tuna | *Thunnus tonggol* |
| Mekajiki | Swordfish | *Xiphias gladius* |
| Kurokajiki | Blue Marlin | *Makaira mazara* |
| Shirokajiki | Black Marlin | *Makaira indica* |
| Makajiki | Striped Marlin | *Tetrapturus audax* |
| Bashokajiki | Sailfish | *Istiophorus platypterus* |
| Furaikajiki | Shortbill Spearfish | *Tetrapturus angustirostris* |

Source: U.S. Embassy, Tokyo.

3) According to the FAJ, the Japanese Government has not received any applications from foreign fishermen for fishing for highly migratory species of fish within the Japanese 200-mile fishing zone. The U.S. Embassy in Tokyo understands, however, that during the 1983 annual Japan-Soviet fisheries negotiations, the Soviet Union requested, and Japan issued, exploratory licenses to two Soviet purse seiners to fish for tuna within the Japanese 200-mile zone: near the Bonin Islands in the Pacific Ocean south of 32 degrees north latitude, east of 142 degrees east longitude, and enclosed by Japan's 200-mile zone. These exploratory licenses were provided free to the Soviet Union as they were part of a bilateral fisheries agreement in which the two countries were fishing in each other's zones on a reciprocally free of charge basis. However, it is unknown if the two Soviet purse seiners actually caught tuna in the Japanese zone in 1983.

**Transferring Vessel's Flag of Registry**

Officials of the Ministry of Transportation have confirmed that the Ship Law of Japan (Law No. 46 of March 8, 1899, as amended) does not authorize foreign fishermen to transfer their vessel's flag of registry to Japan. The Law provides that:

Article 2: None other than Japanese ships shall hoist the Japanese national flag.

Article 1 (Definition): the following ships shall be defined as Japanese ships:
(1) Ships owned by the Japanese Government or Japanese public offices.
(2) Ships owned by Japanese nationals.
(3) Ships owned by commercial corporations with their principal offices in Japan, of which all of the partners in the case of unlimited partnerships (*Gomei-Kaisha*), all of the partners with unlimited liability in the case of limited partnerships (*Goshi-Kaisha*), and all of the directors in the case of companies with limited liability (*Kabushiki Kaisha*) and joint-stock companies (*Yugen-Kaisha*), are Japanese nationals.
(4) Ships owned by juridical persons with their principal offices in Japan, of which all of the representatives are Japanese nationals.

**Labor problems:** Two problems facing the entire Japanese distant-water fishing fleet are especially acute for the distant-water tuna/billfish fleet. They are: 1) a shortage of fisheries labor, and 2) the aging of the fisheries work force. Japanese youth are not attracted to work perceived to be *kiken* (dangerous), *kitsui* (hard), and *kitanai* (dirty). The result is a workforce which is smaller in number and older in age.

One obvious solution to this problem, particularly for the distant-water tuna fleet, is to hire foreign labor from developing countries. In 1992, Japan's distant-water longliners employed 1,586 foreign laborers, distant-water pole-and-liners employed 101 foreign workers, and distant-water purse seiners employed 39 foreigners, bringing the total to nearly 2,000 workers. By country, these workers came from Indonesia (1,387), the Philippines (361), Peru (284), Kiribati (101), South Africa (44), Micronesia (30), Burma (5), Fiji (2), and Panama (1).[21]

The Japanese fisheries industry is attempting to reduce the need for domestic labor by automating fishing operations as much as possible (e.g. moving from two-vessel to one-vessel purse seine operations). Automation is expensive, however, so many vessel owners have gone into considerable debt to finance these improvements.

**Law Restricting Employment of Foreign Crewmen**

The Ship Officers' Law (Law No. 149 of April 16, 195, as amended) provides that the owner of a Japanese ship must place licensed officers (captain, navigator, engineer, and radio operator) aboard. The law, however, does not require that all crew members be Japanese nationals. On the other hand, there is a cabinet decision of May 1988 (which was renewed in July 1992) stipulating that "Japan cannot accept unskilled foreign workers (confirmed by the Ministry of Labor.)."

The Japanese owners of tuna longliners have been eager to employ cheap and unskilled foreign workers as deck workers aboard their vessels to reduce the cost of fishing operations and thereby increase their competitiveness. However, for fear of losing jobs, the primary labor organization (All Japan Seamen's Union), has been opposed to this idea.

In 1990, an agreement was reached between the All Japan Seamen's Union and Japan Tuna allowing unskilled foreign deck workers to work on Japanese tuna longliners. Since then the number of unskilled foreign deck hands working aboard Japanese tuna longliners has been increasing (see Table 5):

Table 5. Foreign workers on Japanese tuna longliners.

| Year/Date | Total Number of Foreign Workers Accepted by Tuna Longliners | Number of Foreign Workers per Tuna Longliner | Number of Japanese Tuna Longliners Accepting Foreign Workers |
|---|---|---|---|
| March 31, 1990 | 429 | 2.5 | 174 |
| March 31, 1991 | 802 | 3 | 270 |
| March 31, 1992 | 1176 | 3.8 | 309 |
| March 31, 1993 | 1596 | 4.5 | 356 |
| March 31, 1994 | 1965 | 5.6 | 349 |

Source: U.S. Embassy, Tokyo.

Note: It was noted in the Japanese tuna industry press that the number of foreign fishermen employed on Japanese tuna vessels reached 2,015 men as of December 31, 1994. The fishermen came from the following countries: Indonesia (1,713), Peru (282), and South Africa (20). (Source: *Katsuo-Maguro Tsushin*, January 30, 1995).

The current labor-management agreement allows foreign deck workers to comprise up to 25 percent of the total crew of the vessel, but the ratio will be raised to 40 percent in the near future. President Ueda of Japan Tuna said that the total number of foreign workers aboard Japanese tuna longliners would reach 5,000 in five years.[22]

The U.S. Embassy in Tokyo notes that in addition to employing foreign deck workers, there are two other steps being contemplated by the Japanese tuna fishing industry to reduce the cost of operation:

1) the Japanese owner of a Japanese tuna longliner boat charters it to a foreign company which employs as many foreign deck workers as possible and re-charters it back to the Japanese owner. In this case, the placement of ship officers is still subject to the Japanese Law, but deck workers are not; and

2) The Japanese owner exports a tuna longliner, then changes its flag of registry to a foreign country, and operates that vessel. This allows circumvention of the Japanese law requirement pertaining to ships' officers. To avoid international criticism of these so-called "flag of convenience" registration, the Japanese owners must be careful about operating these vessels under sound principles of sustainable resources management. These tactics are indicative of the serious economic problems that the Japanese tuna fishing industry faces at present.

## XI. Research

Since it was established in 1971, the Japan Marine Fishery Resources Research Center (JAMARC) has been engaged in exploratory tuna longline fishing in the Pacific, Atlantic, and Indian Oceans. During Japan fiscal year (JFY)-1994, JAMARC chartered a 500 GRT tuna longliner and conducted exploratory/feasibility fishing in the high-seas of the eastern Tropical Pacific Ocean to obtain basic data on bigeye tuna distribution and migration.

Pursuant to the "Law for Promotion of Marine Fishery Resources Development" (Law No. 60 of June 24, 1971), JAMARC was established in 1971 as a special corporation with initial capital amounting to ¥400 million (¥300 million yen from FAJ and ¥100 million from the fishing industry) (Note: This amount equalled approximately $1.1 million in 1971). Its objectives were to develop new fishery resources such as tuna and billfish for commercial exploitation by the Japanese pelagic fishing industry. In 1990, the development of fishery resources within Japan's 200-mile fishing zone was added to JAMARC's objectives. In JFY-1994, JAMARC's operating budget was $72 million including $48 million in subsidies from FAJ. Japan has also been engaged in exploratory fishing for new species within foreign 200-mile zones at the request of various foreign governments.[23]

Research on tuna/billfish fisheries is also conducted by scientists affiliated with the FAJ's National Research Institute of Far Sea Fisheries, located in Shizuoka Prefecture. Research at this facility concentrates on stock assessment and management technologies for distant-water fisheries, including the Japanese tuna/billfish longliner fishery. Within the Institute, the Pelagic Fish Resources Division (Director: SUZUKI Jiro) is responsible for tuna/billfish research and is composed of four sections: Temperate Tuna (Chief: ISHIZUKA Yoshio), Tropical Tuna (Chief: TSUJI Sachiko), Tuna Ecology (Chief: UOZUMI Yuji), and Tuna Fisheries (Chief: WARASHINA Yukio).

## XII. Foreign Interests[24]

Japan has concluded 12 government-to-government and 12 private bilateral tuna fishery arrangements with

foreign countries. Japanese companies have also employed joint ventures and charter/lease arrangements to secure access to foreign fishery resources when direct access is constrained by stringent regulations. Available information on individual countries is as follows:

**ASIA**

**India**: The Japanese tuna industry has secured access to the Indian tuna resource through the formation of a joint venture company. The joint venture was formed between Hoko Fisheries and the Bay Liners Ltd. company of Hyderabad, India. The company purchased one new Japanese 49-m longliner and is reportedly engaged in exploratory fishing.[25]

**Indonesia**: Japanese longliner fishing off the Indonesian archipelago began in the 1930s with test fishing in the Indian Ocean. Commercial tuna longlining began in October 1952. Japanese tuna longliners began to operate in the Banda Sea around 1960, with this fishery reaching a peak in 1964 when approximately 50 vessels of the 50-GRT class operated on this ground. A bilateral agreement was concluded in 1969 under which Japan agreed to pay an access fee for vessels operating in the Banda Sea. This agreement was discontinued in 1980 with the establishment of an Indonesian EEZ.[26]

Between 1980 and 1983, Japanese longliners were restricted to northern waters of Indonesia's Pacific Ocean EEZ.[27] No information is available which indicates Japanese longliners were licensed to fish between 1984 and 1988. In July 1988, 2 Japanese longliners were licensed by the Indonesian Government, and this figure increased to 9 vessels in December 1990. All of these longliners were between 100-200-GRT. In 1988, the majority of foreign longliners were based in Jakarta and Benoa (western and eastern Java).[28] It has been reported that some foreign longliners shifted their base of operations to Bungus-Padang (western Sumatra) in 1993, though it is unclear whether Japanese longliners are included.[29]

**Philippines**: A Japanese tuna importer and local company have reportedly established a joint venture operation at a "fresh tuna base" located in the port city of Davao on the southern island of Mindanao. The tuna base, which began operations in June 1995, provides freezing and processing facilities for the shipment of *sashimi* tuna to the Japanese market. By the end of 1995, four Taiwan companies are expected to form a joint venture with a Japanese fishing company. This base was constructed with funding provided by the Japanese Overseas Economic Cooperation Fund. The Philippines Government, which manages the base, hopes to attract foreign tuna longliners by publicizing the base's low operating costs, reportedly lower than those of neighboring fresh tuna ports in Guam and Palau.[30]

**OCEANIA**

**Australia**: Japanese tuna longliners fish in Australian waters under a government-to-government agreement first signed in November 1979. During 1994/95, a maximum of 250 Japanese longliners could fish for tuna in the Australian EEZ for a fee of $3.25 million, an 11 percent decrease from the 1993/94 season. The Japanese quota for Southern Bluefin Tuna (SBT) in the Tasmania region was 400 t, unchanged from 1993/94. In the tuna fishery off the Australian east coast, the number of Japanese longliners granted access to yellowfin and bigeye tuna was 55 vessels with a 200 t SBT catch quota. The number of Japanese longliners granted access to grounds off the Australian west coast is 20 vessels.[31]

Japanese longliners operating in Australian waters are normally between 35 and 45 m in length and set approximately 3,000 hooks per day on mainlines which measure from 70 to 110 km long. The most productive fishing grounds are located in the east, off southern Queensland, and surrounding Lord Howe Island. Significant catches are also taken south of Norfolk Island, in the Coral Sea off north Queensland, and off northwestern Australia. Swordfish catch from northeastern and northwestern waters is mostly bycatch of vessels targeting yellowfin tuna. Japanese longliners fishing for bigeye tuna off southwestern Australia from October to April each year also report significant swordfish bycatch. The annual catch of swordfish in Australian waters by Japanese longliners ranges between 700 and 1,000 tons.[32]

**French Overseas Territories**: A government-to-government agreement was initially reached between Japan and France in July 1979. The agreement allows Japanese tuna fishing in the waters off Polynesia, New Caledonia, and Wallis-Futuna. The 1991 agreement allowed 99 Japanese longliners to catch 5,000 t for a fee of $1.2 million (¥155 million) off French Polynesia; 40 longliners and 12 pole-and-liners to catch 2,225 t for a fee of $350,000 (¥47 million) off New Caledonia; and 3 longliners and 3 pole-and-liners to catch 460 t for a fee of $60,000 (¥8 million) off Wallis and Futuna.[33]

Negotiations for the 1992 agreement broke off when the two sides could not reach agreement on the amount of

access fees. Japan reported a sharp decrease in the tuna catch in French Overseas Territories' waters during 1991-92 because of the El Niño phenomenon. Consequently, Japan expected less industry interest in this fishing area and requested lower access fees. France, however, insisted on maintaining the same fee level as in 1991-92.[34] As a result of this breakdown in talks, Japanese vessels did not fish in French Pacific waters during the 1992/93 and 1993/94 seasons.

A one-year agreement reached in 1994 allowed 39 Japanese vessels access to 3,000 t of tuna beginning in August 1994, in exchange for a fee of $900,000 (¥102 million) and mechanical equipment worth $300,000 (¥34 million). A total of 36 Japanese vessels could catch up to 2,500 t in New Caledonia, with 3 vessels allowed to catch 500 t off Wallis and Futuna.[35] The question of access to French Polynesia waters was deferred to an unspecified future meeting.[36]

Negotiations for the 1995-96 fishing season were expected to be difficult, as Japanese vessels posted disappointing catches in 1994, with few Japanese vessels interested in gaining access to these waters.[37] Reports from the July 1995 negotiations indicate that 20 Japanese longliners will be able to catch 1,500 t of tuna in New Caledonia, with 2 vessels allowed to catch 200 t off Wallis and Futuna. Access to French Polynesian waters was denied--the French side stating all available licenses had been previously allocated to ROK vessels. In addition, Japanese vessels fishing in French Pacific Territory waters will have to be equipped with satellite transponder devices.[38]

**Kiribati**: There is a private agreement for tuna longliners and skipjack pole-and-liners which took effect in June 1978. During 1991, a total of 40 Japanese tuna vessels caught 3,000 t in Kiribati waters. Negotiations in 1993 concerning extension of the agreement between the Japanese tuna industry and Kiribati ended with Kiribati declaring the agreement to be null and void as of August 3, 1993.[39] The most recent report available, however, indicates that the Japan-Kiribati fishery agreement has been extended, with the current operational terms remaining unchanged.[40]

**Republic of the Marshall Islands (RMI)**: A government-to-government agreement went into effect in April 1981 and fees are currently paid on a per-vessel per-trip basis. There is apparently one joint venture company called Nankatsu Corporation Inc. which was established in 1984 by Nanyo Shigen for skipjack fishing and processing in the Marshall Islands. The U.S. Embassy in Tokyo reports that a supplementary agreement between the Japanese tuna industry and the RMI was effective from September 1, 1993, to August 31, 1994, with automatic extensions.[41]

**Federated States of Micronesia (FSM)**: Japan first gained access to the FSM tuna resource in January 1979 when a private agreement became effective. The original agreement was based on a lump-sum payment system where vessels paid a single fee to operate in the Micronesian EEZ during the agreed period. A per-vessel per-trip system was introduced in 1984, by which vessels pay an annual registration fee and permit fee each time they enter the Micronesian EEZ. Japan paid Micronesia nearly $31 million in access fees between 1979-90, accounting for over 75 percent of total FSM revenue obtained from access fees.[42]

A Japanese/FSM joint venture company, Pacific Islands Airflight Corporation (PIAC), reportedly began operations in February 1995 under the auspices of the Okinawa-based Shonan Fishing Company and the FSM National Fisheries Corporation (NFC).[43] The start-up capital for PIAC was $10,000 with Shonan and NFC evenly splitting the cost. Shonan was established in October 1994 by a Japanese consortium of seven Okinawa fishing cooperatives as well as by independent fishermen based in Okinawa, Shikoku, and Kyushu. The venture will allow small-scale Japanese tuna vessels (less than 20 GRT) to fish in FSM waters, with catches to be shipped to Guam for airfreighting to Japan. A support company would also reportedly be established and managed by four Japanese fishery associations (Kinkatsukyo, Nikkatsuren, Kaimakikyo, and Hokumakigyoren) and initially funded by the Japanese Overseas Cooperation Foundation.[44] Support company profits would be used to finance operational costs for aircraft used by the joint venture. There were 13 Okinawa longliners based in Pohnpei, FSM, in early 1995 with plans to expand this fleet to 20 vessels in the future.[45] A recent report from the U.S. Embassy indicates a total of 57 Japanese longliners are licensed to fish in FSM waters.[46]

Other joint ventures were established between Taiyo Fisheries and the Chuuk State Government in 1990, and between the Japan Overseas Fisheries Company and Chuuk in 1991. Both joint ventures are currently inactive.[47]

**Nauru**: Japan and Nauru concluded a private agreement in May 1994 which provides access for Japanese longliners on a per-vessel, per-trip entry fee basis. The fee of five percent of catch value would continue for a

minimum of three years. The first-year fee for longliners less than 100-GRT was $4,500 (¥503,000), and $5,400 ( ¥611,000) for vessels more than 100-GRT.[48] This agreement was effective until June 30, 1995, and thereafter would be extended automatically.[49] Negotiations which took place in February 1996 concerning access fees resulted in a renewal of the five percent fee.[50]

**New Zealand**: Japanese tuna longliners operate in New Zealand waters under a government-to-government general access agreement which was reached in September 1978. A total of 40 Japanese tuna longliners were permitted to fish in the New Zealand EEZ during the 1990/91 fishing season.

Bilateral talks concerning Japanese tuna fishing in the New Zealand EEZ concluded without agreement in Tokyo in January 1993. In December 1992, New Zealand informed Japan of its proposed regulations for Japanese fishing during the 1992/93 season. During the January 1993 meeting, Japan requested less stringent terms regarding fishing zones, vessel numbers, fees, and observers, but New Zealand promised only to review its terms.[51]

The New Zealand Government reports, however, that 17 Japanese longline vessels were permitted to target Southern Bluefin Tuna in the southern tuna fishery during the 1992/93 fishing season. A total of 9 Japanese longliners were permitted to target albacore and yellowfin tuna in New Zealand's northern tuna fishery.[52]

**Palau**: A private tuna fishing agreement was first concluded in January 1979. Japan has paid fees using a lump-sum system although it has proposed changing this to a "per vessel per trip" system. Disputes over this issue have caused several interruptions in this agreement. A new agreement reached in September 1991 provides for annual and per trip vessel permits. A total of 33 purse seiners and 65 longliners applied for permits and paid a $650,000 access fee ($500,000 under the previous agreement).[53]

The private venture, Palau International Traders Inc., reportedly has Japanese and Micronesian ownership, in partnership with Palauans. The firm operates 54 tuna longliners, most of which are registered in China and Taiwan.[54]

**Papua New Guinea**: Japan and the PNG signed a private fisheries agreement in 1978, but the agreement was terminated in 1987 when the two sides could not agree on fishing fees.

**The Solomon Islands**: Japanese involvement in the Solomon Islands began in 1971 when Taiyo conducted an exploratory tuna fishery. Taiyo soon after formed a joint venture tuna fishing and processing company called Solomon Taiyo Ltd. (STL). The company was launched with 75 percent Japanese and 25 percent Solomon Islands ownership. STL currently operates 20 pole-and-line vessels, 12 of which are chartered from Okinawa Prefecture. In addition, STL operates 3 group purse seiners and one single purse seiner. Most of the catch is skipjack which is landed and canned at local ports.[55]

Japan and the Solomon Islands concluded a government-to-government access agreement in September 1978, which is supplemented by a private agreement. The Solomon Islands Government reported in 1994 that 66 Japanese longliners were licensed to fish in the Solomon Islands EEZ. The Japanese Tuna Association pays a 4 percent access fee, based on value of the catch during the licensing period.[56]

**Tuvalu**: Japan and Tuvalu concluded a government-to-government agreement in June 1986 which is supplemented by a private access agreement.[57]

**AFRICA/MIDDLE EAST**

**The Gambia**: Japan reached a private-level agreement with the Gambia in July 1992. The agreement allowed 40 Japanese longliners and 2 purse seiners access to the Gambian EEZ for one year with automatic extensions. Longliners paid a fee of $1,000 per vessel for 3 months of fishing, and $350 per month for a one-month extension. Purse seiners paid a fee of $5,000 per vessel for 5 months of fishing.[58]

**Guinea-Bissau**: A private agreement was reportedly concluded in September 1993 which allowed 30 Japanese longliners access to Guinea-Bissau waters for one year. The access fees were $2,400 per vessel per three months, with an extension fee of $800 for one month.[59]

**Mauritania**: The 1991 Japan-Mauritania private fisheries agreement allowed 30 Japanese longliners access for an access fee of $3,600 per longliner for 3 months, with an option for a one-month extension for $1,200 per vessel.[60] The terms of the 1992 agreement (effective July 30, 1992-July 29, 1993) called for increased access fees of $3,900 per longliner for 3 months, with an option for a one-month

extension for $1,300 per vessel. A total of 30 Japanese longliners were permitted to fish in Mauritanian waters.[61]

**Morocco**: Morocco and Japan have annually renewed a government-to-government fishing agreement since 1985. The renewal completed in mid-1993 allowed up to 30 Japanese longliners to catch tuna, primarily bluefin, in Moroccan waters. Japan paid $5,500 per vessel for three months of fishing, a slight decrease from the 1992 fee of $6,500.[62]

The terms of the most recent renewal, concluded in the fall of 1995, are as follows: 1) up to 30 Japanese longliners will be allowed to catch tuna in Moroccan waters of the Atlantic Ocean, 2) Japan will pay a $2,000 access fee as well as a $4,300 license fee for each vessel, 3) one Moroccan scientific observer will ride on up to 5 Japanese vessels, with estimated costs of $30,000 to be covered by Japan, 4) Japan will provide Morocco with $33,000 worth of fishing equipment, a ten percent increase over the 1995 amount. One significant difference with the previous agreement is that one Moroccan will be employed on each Japanese vessel (with the exception of the Japanese vessels hosting scientific observers). In the previous provisional agreement, four Moroccans were employed on Japanese vessels with 35 Moroccans receiving on-shore training.[63]

**Oman:** A fisheries aid agreement was signed with Oman in May 1993.[64] Japan will provide Oman with a 16-m fisheries research vessel, send five Japanese fishery experts to the Oman Ministry of Agriculture and Fisheries, and train 15 Omanis in Japan. The aid package will be carried out over five years and was budgeted at $10 million. It is unclear whether Japanese access to Omani tuna and demersal resources are a part of this agreement.

**Senegal**: Japan and Senegal concluded a government-to-government fisheries agreement on October 14, 1991. The agreement allowed Japanese tuna vessels access to Senegalese waters for the first time since Senegal declared a 200-mile EEZ in 1976. The agreement allowed 40 Japanese longliners access in exchange for a fee of $1,500 per vessel per month. In addition, 2 Japanese purse seiners were granted access for an advance fee of nearly $1,400 per vessel.[65]

Continued access for Japanese longliners was threatened in late 1993 when Senegal sought to require that Japanese purse seiners land their catch in Senegalese ports. The issue was resolved when the Japanese Overseas Fisheries Cooperation Foundation offered an unspecified amount of assistance. In early 1994, several Japanese longliners reportedly had been licensed to fish in Senegalese waters.[66]

**Seychelles**: The Japanese tuna longliner industry has an access agreement with the Seychelles which is renewed automatically each year. Japan has refused to sign a government-to-government fishery agreement with the Seychelles because its vessels fish there only a few months of the year. The number of Japanese longliners licensed in the Seychelles decreased from 40 in 1988 to 19 in 1990.[67] More recent data indicate 20 licenses were granted to Japanese vessels in 1993 and 21 licenses were granted in 1994.[68]

**Sierra Leone**: The Japan-Sierra Leone private fisheries agreement gives Japanese tuna longliners and purse seiners access to the Sierra Leone EEZ. The agreement reached in November 1990 imposes an access fee of $2,400 per longliner for 3 months of fishing with a possible one-month extension for a fee of $800 per longliner. Purse seiners must pay $5,000 per vessel for 3 months, with a possible one-month extension for a fee of $1,700 per seiner. A total of 20 longliners and 2 purse seiners are allowed access under the agreement.[69]

**South Africa**: Japanese longliners have operated in South Africa under a government-to-government agreement which was first concluded in December 1977. An agreement concluded in 1994 provides access to 90 Japanese longliners for an annual access fee of $1,400 per vessel (unchanged from 1993) or a 6-month access fee of $1,100 per vessel (a 10 percent increase over 1993). Japan requested that the number of licensed longliners be increased by 10 vessels and South Africa indicated it would consider the request. The payment schedule for access fees has been changed from two payments in January and July to a single annual payment made one month prior to the start of fishing.[70] Reports on negotiations for the 1996 fishing season indicate that 90 Japanese longliners were granted access in 1995 for an annual fee of $3,700 per vessel. Japan and South Africa have agreed that 90 Japanese longliners will be granted access in 1996, but South Africa is requesting greatly increased fees, so no final agreement had been reached as of February 1996.[71]

South African officials report much of the catch appears to be made south of Cape Agulhas, with much of it east of the ICCAT convention area. Reported total catches indicate Japanese vessels target bigeye tuna, yellowfin tuna, and swordfish, with small catches of marlin and southern bluefin tuna. Catch figures reported in 1995 indicate that swordfish comprised 13 percent of

the total Japanese longliner catch in South African waters.[72]

## EUROPE

**Portugal**: Japanese tuna longliners secured access to tuna in the Portuguese EEZ off the Madeira Islands under an agreement reached in 1980. The agreement became void in 1986 when Portugal became a member of the European Community (EC). Since that time, Japanese longliners have secured access through licenses issued by the EC. During 1990, 10 Japanese longliners were permitted to catch 80 t of bluefin tuna.

## LATIN AMERICA

**Argentina**: Japan reportedly requested access to Argentine waters for 30 Japanese longliners in September 1993. Argentina suggested a joint venture arrangement while agreeing to consider a simple access agreement. No further details are available.[73]

**Brazil:** A small number of Japanese longliners have been chartered by Brazilian companies out of the port of Rio Grande do Sul to fish in Brazilian waters. The number of longliners peaked at six in 1986 and has been fewer than five since 1990. Almost all Japanese longliners in this fishery have been 201-500-GRT class vessels. Brazilian statistics indicate one Japanese longliner fished in Brazilian waters in 1992, and two Japanese longliners were licensed in 1993 and 1994. Catches for the Japanese longliner fleet in Brazil ranged from 1,000 to 2,300 tons until 1991. The reduced Japanese fleet caught just 824 t in 1992 and 304 tons in 1993. The catch was composed largely of albacore, yellowfin, and bigeye tuna, with a significant swordfish bycatch. Swordfish catches have comprised between 11 and 38 percent of the total since 1983.[74]

**Chile:** Various reports in 1992 suggested that 11-15 Japanese tuna longliners were based in the northern Chilean port of Arica, to longline for tuna outside of Chile's 200-mile limit. The Japanese shifted the vessels from the Peruvian port of Callao and planned to transship their tuna catch through Arica. A Japanese vessel was also authorized to conduct experimental tuna fishing in Chilean waters off Easter Island during 1993.[75]

**Colombia/Ecuador**: The Japan Maritime Safety Agency asked Japanese prosecutors to file charges against three Japanese fishing companies for allegedly poaching 2,000 t of skipjack and other tuna species in the South Pacific during 1994. Longliners operated by Sasashima Gyogyo of Ibaraki Prefecture and two other companies caught the fish without the proper Japanese Government permits off Ecuador and Colombia between 1991 and 1993. The tuna was reportedly landed in Central American ports for shipment to Japan where it was sold for $15.5 million (¥1.6 billion).[76]

**Peru**: Japanese longliners have purchased licenses to fish for tuna and billfish in Peruvian waters since the 1970s, but increased fees have discouraged Japanese longliners over the years. Unconfirmed reports indicated that only limited Japanese tuna fishing took place in 1992. Press reports in 1992 indicated that 15 Japanese vessels were transferred to Chile and based in Africa, possibly vessels that were moved from either Peru or Ecuador.[77] The most recent information indicates seven Japanese longliners were licensed to fish in Peruvian waters between 1993 and 1995.[78]

## NORTH AMERICA

**Canada**: Canada and Japan concluded a government-to-government tuna fishing agreement on April 28, 1978.

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78. For further details on vessel names, size, capacity, and licensing period, please refer to the Latin America volume of this study.

## Appendices--Fleet

Appendix 1. Japan. Number of licensed tuna/billfish fishing vessels for designated fisheries, 1980, 1985-95.

| Type of Fishery | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Number of Vessels* | | | | | | |
| **Longliners** | | | | | | | | | | | | |
| Distant-water | 1,171 | 901 | 889 | 883 | 851 | 859 | 854 | 834 | 785 | 802 | 773 | 743 |
| Offshore | 1,000 | 884 | 744 | 628 | 571 | 563 | 553 | 530 | 456 | 432 | 402 | 371 |
| **Billfish Driftnetters** | 457 | 470 | 474 | 460 | 459 | 468 | 321 | 281 | 277 | 132 | NA | NA |
| **Total** | 2,628 | 2,255 | 2,107 | 1,971 | 1,881 | 1,890 | 1,728 | 1,645 | 1,518 | 1,366 | 1,175 | 1,114 |

Sources: The Fisheries Agency of Japan for data up to 1989, and "Annual Statistical Report on Fisheries and Aquacultural Production, 1993" for data from 1990-1993. Data for 1994 and 1995 comes from the U.S. Embassy, Tokyo.

Note 1. Except for gear and area restrictions under a MAFF Ministerial Ordinance, large-mesh billfish driftnet fishing was exempt from the Japanese licensing system until July 1989. In order to deal with international criticism against the driftnet fishery, this fishery became subject to registration with the Japanese MAFF Minister effective from August 15, 1989.

Note 2. In compliance with UNGA Resolution 46/215 of December 20, 1991,calling for a cessation of driftnet fishing on the high seas by the end of 1992, there have been no Japanese large-mesh billfish driftnetters on the high seas since 1992.

Note 3. According to the Fisheries Agency of Japan, approximately 130 billfish driftnetters have registered with the Japanese MAFF Minister for fishing within the Japanese 200-mile zone as of June 1995. Of these, the number of vessels actually operating is unknown because the registration system does not necessarily mean actual fishing.

Note 4. Purse seiners catch tuna, skipjack, mackerel, sardine, etc. but do not catch swordfish and billfish. Accordingly, purse seiners are not included in tuna fishing vessels.

Note 5. Except for the large-mesh billfish driftnetters on the high seas which terminated operations effective January 1, 1993, swordfish and billfish have not been a targeted species for Japanese fishermen but instead are largely bycatch in tuna longlining.

Appendix 2. Japan. Distant-water tuna longliners, by number and vessel size class, 1980, 1985-94.

| Year | Vessel class | | | |
|---|---|---|---|---|
| | 50-100GRT | 100-200GRT | Over 200GRT | Total |
| 1980 | 135 | 103 | 645 | 883 |
| 1985 | 86 | 109 | 628 | 823 |
| 1986 | 54 | 132 | 632 | 818 |
| 1987 | 23 | 147 | 649 | 819 |
| 1988 | 4 | 154 | 649 | 807 |
| 1989 | 1 | 152 | 653 | 806 |
| 1990 | -- | 127 | 664 | 791 |
| 1991 | -- | 108 | 682 | 790 |
| 1992 | -- | 87 | 681 | 768 |
| 1993 | -- | 85 | 682 | 767 |
| 1994 | - | 75 | 674 | 749 |

Source: *Gyogyo Yoshoku Seisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 3.Japan. Distant-water tuna longliners fishing fleet; by fishing grounds and gross registered tonnage; 1980-94.

| Year | Atlantic Ocean | | | Indian Ocean | | |
|---|---|---|---|---|---|---|
| | 50-200GRT | 200-500GRT | Over 500GRT | 50-200GRT | 200-500GRT | Over 500GRT |
| 1980 | -- | 300 | -- | NA | NA | NA |
| 1981 | -- | 320 | -- | NA | NA | NA |
| 1982 | -- | 269 | -- | NA | NA | NA |
| 1983 | -- | 182 | -- | NA | NA | NA |
| 1984 | -- | 212 | -- | NA | NA | NA |
| 1985 | -- | 208 | -- | 28 | 291 | -- |
| 1986 | -- | 190 | -- | 23 | 255 | -- |
| 1987 | -- | 146 | -- | 17 | 225 | -- |
| 1988 | -- | 183 | -- | 13 | 207 | -- |
| 1989 | -- | 239 | -- | 12 | 191 | -- |
| 1990 | -- | 235 | -- | 14 | 183 | -- |
| 1991 | -- | 242 | -- | 10 | 169 | -- |
| 1992 | -- | 248 | -- | 7 | 173 | -- |
| 1993 | -- | 307 | -- | 10 | 179 | -- |
| 1994 | -- | 261 | -- | | | |

Sources: Atlantic Ocean-ICCAT Statistical Bulletin, 1993: 1993/94 data from the *National Report of Japan*, National Insitute of Far Seas Fisheries. Indian Ocean-Indo-Pacific Tuna Development and Management Programme Data Summary No. 14, 1995.

Appendix 4. Japan. Profitability of distant-water fleets, 1987-91.

| Vessel Type | Year | | | | |
|---|---|---|---|---|---|
| | 1987 | 1988 | 1989 | 1990 | 1991 |
| | *Millions of Yen* | | | | |
| Tuna Longliner (200-500GRT) | | | | | |
| Total Revenue | 371 | 385 | 441 | 429 | 365 |
| Labor Cost | 142 | 153 | 158 | 167 | 141 |
| Fuel Cost | 42 | 37 | 33 | 40 | 44 |
| Total Expenses | 368 | 377 | 390 | 427 | 402 |
| Net Profit | 3 | 8 | 21 | 2 | -37 |
| Skipjack Pole and Line (200-500GRT) | | | | | |
| Total Revenue | 310 | 325 | 358 | 365 | 322 |
| Labor Cost | 125 | 135 | 152 | 151 | 133 |
| Fuel Cost | 48 | 47 | 46 | 52 | 59 |
| Total Expenses | 317 | 336 | 358 | 367 | 380 |
| Net Profit | -7 | -11 | 0 | -2 | -58 |
| Trawler (200-500GRT) | | | | | |
| Total Revenue | 676 | 675 | 386 | 286 | 431 |
| Labor Cost | 245 | 241 | 134 | 131 | 154 |
| Fuel Cost | 102 | 102 | 54 | 105 | 106 |
| Total Expenses | 743 | 722 | 443 | 429 | 559 |
| Net Profit | -67 | -47 | -57 | -143 | -128 |

Source: US Embassy, Tokyo, May 28, 1993.

Appendix 5.Japan. Off-shore tuna longliners, by number and vessel size class, 1980, 1985-94.

| Year | Vessel class | | |
|---|---|---|---|
| | 50GRT and below | 50GRT and above | Total |
| 1980 | 57 | 580 | 637 |
| 1985 | 28 | 448 | 476 |
| 1986 | 25 | 417 | 442 |
| 1987 | 23 | 375 | 398 |
| 1988 | 21 | 364 | 385 |
| 1989 | 20 | 333 | 353 |
| 1990 | 21 | 341 | 362 |
| 1991 | 19 | 313 | 332 |
| 1992 | 19 | 283 | 302 |
| 1993 | 18 | 254 | 272 |
| 1994 | 21 | 234 | 255 |

Source: *Gyogyo Yoshoku Seisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 6.Japan. Coastal longliners, by number and vessel size class, 1980, 1985-94.

| Year | Vessel class | | | |
|---|---|---|---|---|
| | Up to 5GRT | 5-10GRT | Over 10GRT | Total |
| 1980 | 258 | 143 | 420 | 821 |
| 1985 | 126 | 89 | 405 | 620 |
| 1986 | 90 | 85 | 361 | 536 |
| 1987 | 166 | 114 | 381 | 661 |
| 1988 | 97 | 132 | 357 | 586 |
| 1989 | 109 | 130 | 411 | 650 |
| 1990 | 127 | 140 | 418 | 685 |
| 1991 | 151 | 165 | 452 | 768 |
| 1992 | 152 | 178 | 463 | 793 |
| 1993 | 131 | 181 | 478 | 790 |
| 1994 | 147 | 187 | 485 | 819 |

Source: *Gyogyo Yoshoku Seisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 7. Japan. Construction of tuna/billfish longliners (distant-water and offshore longliners combined), by year.

| Year | Number of Vessels Built | Aggregate Tonnage (1,000GRT) |
|---|---|---|
| 1980 | 230 | 40.3 |
| 1985 | 90 | 26.8 |
| 1986 | 79 | 20.8 |
| 1987 | 69 | 20.0 |
| 1988 | 97 | 27.9 |
| 1989 | 96 | 27.6 |
| 1990 | 108 | 29.1 |
| 1991 | 80 | 21.0 |
| 1992 | 47 | 9.4 |
| 1993 | 25 | N/A |
| 1994 | 26 | N/A |

Source: 1980-92:Fisheries Agency of Japan; 1993-94: *Katsuo Maguro Tsushin*, No. 7299, July 26, 1995.

Appendix 8. Construction cost for a 379-GRT distant-water tuna/billfish longliner, by year.

| Year | Average Cost (1,000 Yen) | Cost per ton (1,000 Yen) |
|---|---|---|
| 1980 | N/A | N/A |
| 1985 | 440,610 | 1,160 |
| 1986 | 434,880 | 1,150 |
| 1987 | 446,090 | 1,180 |
| 1988 | 454,260 | 1,200 |
| 1989 | 471,210 | 1,240 |
| 1990 | 537,280 | 1,420 |
| 1991 | 588,900 | 1,550 |
| 1992 | N/A | N/A |
| 1993 | 579,010 | 1,528 |
| 1994 | 564,000 | 1,488 |

Source: 1980-91--*Journal of Fishing Boat Association of Japan, Vol. 300*, August 1992; 1993-94--*Katsuo Maguro Tsushin*, No. 7299, July 26, 1995.

Appendix 9. Japan. Specifications of Typical Tuna Vessels.

| Specifications | Vessel Type | | | |
|---|---|---|---|---|
| | Longliner | Skipjack Pole-and-Line | Mother Ship--*Japan Tuna No. 2* | Mother Ship--*Japan Tuna No. 3* |
| Overall Length | 56.00 meters | 56.77 meters | 128.38 meters | 102.64 meters |
| Moulded Breadth | 8.80 meters | 9.50 meters | 19.80 meters | 16.80 meters |
| Moulded Depth | 3.80 meters | 4.45 meters | 10.00 meters | 8.50 meters |
| Moulded Draft | 3.44 meters | 4.00 meters | 8.20 meters | 7.00 meters |
| Main Diesel Engine | 950 ps | 2,000 ps | 6,200 HP | 4,900 HP |
| Auxiliary Engine | 2 sets | 2 sets | 3 sets | 3 sets |
| Service Speed | 11.5 knots | 13.1 knots | 15.4 knots | 15.3 knots |
| Gross Tonnage | 379 tons | 499 tons | 6,480 tons | 4,744 tons |
| Net Tonnage | 235 tons | 193.8 tons | 3,346 tons | 2,001 tons |
| Fish Hold Capacity | 290 tons | 234 tons | NA | NA |
| Dead Weight Capacity | NA | NA | 10,699 tons | 5,895 tons |
| Fuel Tank Capacity | 320 cubic meters | 367 cubic meters | NA | NA |
| Cargo Bulk Tank Capacity | NA | NA | 9,500 cubic meters | 5,340 cubic meters |
| Freshwater Tank Capacity | 25 cubic meters | 17 cubic meters | 600 cubic meters | 581 cubic meters |
| Freezing Capacity | 9 tons/36 hours | 32 tons/time | NA | NA |
| Cold Storage Capacity (Meat) | NA | NA | 215 cubic meters | 230 cubic meters |
| Cold Storage Capacity (Vegetables) | NA | NA | 200 cubic meters | 225 cubic meters |
| Cold Storage Capacity (Bait) | NA | NA | 350 cubic meters | -- |
| Fuel Consumption | 2.5 kiloliters/day | 7.8 kiloliters/day | NA | NA |
| Evaporator Capacity | NA | NA | 25 tons/day | 10 tons/day |
| Number of Crew | 22 | 33 | 36 | 31 |

Source: Japan Tuna 1994

Appendix 10. Major Japanese Shipbuilders of Tuna Longliners

K. K. KANASASHI
ADDRESS: 491, MIHO, SHIMIZU-SHI, SHIZUOKA PREF. 424, JAPAN
TEL: 0543-34-5151
FAX: 0543-35-8525

MIHO SHIPBUILDING COMPANY
ADDRESS: 3797, MIHO, SHIMIZU-SHI, SHIZUOKA PREF.424, JAPAN
TEL: 0543-34-5211
FAX: 0543-34-2767

MITSUI SHIPBUILDING COMPANY
ADDRESS: 5-6-4, TSUKIJI, CHUO-KU, TOKYO 104, JAPAN
TEL: 03-3544-3237
FAX: 03-3544-3031

NAGASAKI SHIPBUILDING COMPANY
ADDRESS: 4-2, NAMINOHIRA-CHO, NAGASAKI-SHI, NAGASAKI PREF. 850, JAPAN
TEL: 0958-26-0191
FAX: 0958-23-5022

NIIGATA IRON WORKS
ADDRESS: 1-4-1, KASUMIGASEKI, CHIYODA-KU, TOKYO 100, JAPAN
TEL: 03-3504-2191
FAX: 03-3591-4764

Appendix 11. Japan. Billfish driftnet fleet, 1989-94.

| Year | 5 Tons or Less | 5-10 tons | Over 10 tons | Total |
|---|---|---|---|---|
| *Number of vessels* | | | | |
| 1989 | NA | NA | NA | 468 |
| 1990 | 47 | 12 | 262 | 321 |
| 1991 | 48 | 7 | 226 | 281 |
| 1992 | 68 | 23 | 186 | 277 |
| 1993 | -- | 11 | 121 | 132 |
| 1994 | -- | 9 | 114 | 123 |

Source: *Gyogyo Yoshoku Suisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 12. Japan. Exports of fishing vessels to China and flag-of-convenience countries, 1985-95.

| Year | | China | Panama | Honduras | Cayman Islands | St. Vincent | Singapore |
|---|---|---|---|---|---|---|---|
| *Number of vessels/Gross registered tonnage* | | | | | | | |
| 1985 | No | 23 | 13 | 5 | 2 | - | - |
| | GRT | 4,047 | 4,034 | 1,324 | 582 | - | - |
| 1986 | No | 22 | 13 | 7 | 2 | - | 1 |
| | GRT | 5,323 | 6,119 | 1,640 | 603 | - | 254 |
| 1987 | No | 9 | 11 | 13 | 1 | 1 | 1 |
| | GRT | 2,231 | 2,640 | 3,598 | 1,197 | 298 | 293 |
| 1988 | No | 5 | 6 | 13 | 1 | 8 | - |
| | GRT | 738 | 1,682 | 3,311 | 299 | 2,170 | - |
| 1989 | No | 3 | 11 | 5 | - | 4 | - |
| | GRT | 554 | 3,928 | 2,501 | - | 741 | - |
| 1990 | No | 4 | 20 | 7 | 1 | 1 | 13 |
| | GRT | 3,389 | 9,135 | 1,319 | 582 | 299 | 1,825 |
| 1991 | No | 11 | 13 | 9 | 1 | 2 | 4 |
| | GRT | 24,837 | 6,004 | 4,403 | 299 | 598 | 825 |
| 1992 | No | 12 | 16 | 6 | - | 2 | - |
| | GRT | 4,753 | 2,960 | 1,831 | - | 748 | - |
| 1993 | No | 18 | 4 | 11 | - | - | - |
| | GRT | 2,576 | 1,272 | 3,669 | - | - | - |
| 1994 | No | 10 | 3 | 5 | - | 1 | - |
| | GRT | 1,445 | 449 | 1,248 | - | 318 | - |
| 1995 | No | 13 | 4 | - | - | - | 1 |
| | GRT | 2,746 | 720 | - | - | - | 198 |
| **Total** | No | 130 | 114 | 81 | 8 | 19 | 20 |
| | GRT | 52,639 | 38,943 | 24,844 | 3,562 | 5,172 | 3,395 |
| | Avg. GRT | 404 | 341 | 306 | 445 | 272 | 170 |

Source: *Japan Imports and Exports*, 1985-95.

Appendix 13. World. Flag of convenience tuna fleets (estimated), 1992.

| Country | Tonnage (GRT) | Number of Vessels |
|---|---|---|
| Honduras | 14,409 | 72 |
| Panama | 11,226 | 56 |
| Singapore | 2,550 | 13 |
| Ecuador | 1,809 | 9 |
| Saint Vincent | 1,710 | 9 |
| Canary Islands | 854 | 4 |
| Others | 7,041 | 35 |
| Total | 39,599.00 | 198 |

Source: *Nikkan Suisan Keizai Shinbun*, July 29, 1992.

Appendix 14. Japan. Total fisheries catch, by type of fishery, 1980, 1985-94.

| Type of Fishery | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Metric tons* | | | | | |
| **Marine Fisheries** | | | | | | | | | | | |
| Distant-water | 2,167,200 | 2,111,300 | 2,335,700 | 2,344,300 | 2,247,400 | 1,976,200 | 1,496,400 | 1,179,000 | 1,270,000 | 1,139,000 | 1,063,000 |
| Off-shore | 5,704,700 | 6,497,600 | 6,792,400 | 6,634,400 | 6,896,800 | 6,340,400 | 6,081,100 | 5,438,100 | 4,534,000 | 4,256,000 | 3,720,000 |
| Coastal | 2,036,700 | 2,268,000 | 2,212,600 | 2,150,700 | 2,115,000 | 2,123,100 | 1,992,400 | 1,894,000 | 1,968,000 | 1,861,000 | 1,807,000 |
| Mariculture | 991,800 | 1,088,100 | 1,198,300 | 1,137,400 | 1,327,400 | 1,272,000 | 1,272,900 | 1,261,900 | 1,306,000 | 1,274,000 | 1,344,000 |
| Sub-total | 10,900,400 | 11,965,100 | 12,539,000 | 12,266,800 | 12,586,600 | 11,711,700 | 10,842,900 | 9,773,000 | 9,078,000 | 8,530,000 | 7,934,000 |
| **Freshwater Fisheries** | | | | | | | | | | | |
| Wild catch | 127,700 | 110,100 | 106,200 | 101,000 | 99,500 | 103,200 | 112,100 | 107,400 | 97,000 | 91,000 | 92,000 |
| Freshwater culture | 93,700 | 96,100 | 93,700 | 96,900 | 98,700 | 98,500 | 96,900 | 97,400 | 91,000 | 86,000 | 77,000 |
| Sub-total | 221,400 | 206,200 | 199,900 | 197,800 | 198,100 | 201,800 | 208,900 | 204,700 | 188,000 | 177,000 | 169,000 |
| **Grand Total** | 11,121,800 | 12,171,300 | 12,738,900 | 12,464,600 | 12,784,700 | 11,913,500 | 11,051,800 | 9,977,700 | 9,266,000 | 8,707,000 | 8,103,000 |

Source: *Gyogyo Yoshoku Seisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 15. Japan. Total tuna catch, by type of fishery, 1980, 1985-94.

| Type of Fishery | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Metric tons* | | | | | |
| **Tuna Longliner** | | | | | | | | | | | |
| Distant water | 211,997 | 232,704 | 229,035 | 201,781 | 216,483 | 169,405 | 169,364 | 180,357 | 196,921 | 205,097 | 196,725 |
| Off-shore | 106,231 | 77,575 | 78,124 | 73,984 | 69,291 | 58,732 | 60,486 | 54,641 | 57,508 | 58,424 | 48,252 |
| Coastal | 23,063 | 24,497 | 24,128 | 26,580 | 26,038 | 26,380 | 29,760 | 30,803 | 33,655 | 42,011 | 39,319 |
| Total Longliner | 341,291 | 334,776 | 331,287 | 302,345 | 311,812 | 254,517 | 259,610 | 265,801 | 288,084 | 305,532 | 284,296 |
| **Skipjack Pole-and-line** | | | | | | | | | | | |
| Distant water | 206,822 | 119,004 | 158,914 | 141,301 | 141,451 | 126,259 | 84,611 | 109,780 | 82,783 | 95,792 | 88,607 |
| Off-shore | 143,145 | 99,422 | 121,271 | 92,711 | 100,319 | 89,411 | 72,605 | 103,606 | 80,653 | 92,576 | 61,507 |
| Coastal | 23,674 | 21,285 | 23,134 | 19,467 | 27,055 | 22,970 | 21,639 | 21,673 | 19,036 | 23,809 | 18,756 |
| Total Pole-and-line | 373,641 | 239,711 | 303,319 | 253,479 | 268,825 | 238,640 | 178,855 | 235,059 | 182,472 | 212,177 | 168,870 |
| **Large Purse Seiner** | | | | | | | | | | | |
| Central Pacific | – | 139,697 | 156,749 | 136,899 | 168,617 | 140,594 | 158,874 | 169,493 | 171,536 | 152,605 | 163,243 |
| Other | 81,677 | 46,495 | 39,423 | 46,285 | 56,083 | 37,187 | 32,380 | 68,189 | 76,610 | 86,993 | 67,294 |
| Total Purse Seiner | 81,677 | 186,192 | 196,172 | 183,184 | 224,700 | 177,781 | 191,254 | 237,682 | 248,146 | 239,598 | 230,537 |
| **Grand Total** | 796,609 | 760,679 | 830,778 | 739,008 | 805,337 | 670,938 | 629,719 | 738,542 | 718,702 | 757,307 | 683,703 |

Source: *Gyogyo Yoshoku Seisan Toke Nenpo*, Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 16. Japanese billfish catch, by species and quantity, 1980, 1985-94.

| Year | Striped Marlin | Swordfish | Blue Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | |
| 1980 | 14,166 | 13,598 | 14,368 | 1,988 | 44,120 | 31% |
| 1985 | 10,910 | 20,363 | 15,910 | 1,452 | 48,635 | 42% |
| 1986 | 13,955 | 18,015 | 14,748 | 1,475 | 48,193 | 37% |
| 1987 | 11,787 | 16,723 | 15,542 | 1,396 | 45,448 | 37% |
| 1988 | 13,790 | 19,359 | 16,498 | 1,336 | 50,983 | 38% |
| 1989 | 10,334 | 15,127 | 11,104 | 867 | 37,432 | 40% |
| 1990 | 7,887 | 14,704 | 10,521 | 1,081 | 34,193 | 43% |
| 1991 | 7,892 | 12,963 | 10,257 | 1,095 | 32,207 | 40% |
| 1992 | 7,549 | 15,352 | 11,310 | 1,159 | 35,370 | 43% |
| 1993 | 8,318 | 15,093 | 11,746 | 782 | 35,939 | 42% |
| 1994 | 7,969 | 13,816 | 12,197 | 104 | 34,086 | 41% |

Source: *Gyogyo Yoshoku Seisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 17. Japan. Billfish catch, by gear and quantity (metric tons), 1980, 1985-94.

| Year | Tuna Longliners | | | Driftnet* | Gillnet* | Trapnet | Other | Total |
|---|---|---|---|---|---|---|---|---|
| | Distant-water | Offshore | Coastal | | | | | |
| 1980 | 23,359 | 16,355 | 2,329 | – | 6,218 | 344 | 1,515 | 44,120 |
| 1985 | 26,186 | 13,361 | 2,904 | – | 3,896 | 440 | 1,854 | 48,635 |
| 1986 | 24,106 | 14,123 | 2,950 | – | 5,115 | 427 | 1,472 | 48,193 |
| 1987 | 25,710 | 11,961 | 3,925 | – | 3,121 | 394 | 1,237 | 45,448 |
| 1988 | 30,855 | 11,586 | 2,977 | – | 3,706 | 310 | 1,549 | 50,983 |
| 1989 | 20,755 | 8,169 | 3,136 | – | 3,342 | 243 | 1,787 | 37,432 |
| 1990 | 17,998 | 8,096 | 3,202 | 3,296 | 33 | 383 | 1,185 | 34,193 |
| 1991 | 18,523 | 6,744 | 3,643 | 2,032 | 72 | 205 | 988 | 32,207 |
| 1992 | 20,651 | 6,754 | 4,293 | 2,296 | 63 | 359 | 954 | 35,370 |
| 1993 | 20,056 | 7,951 | 5,398 | 1,272 | 56 | 116 | 1,090 | 35,939 |
| 1994 | 19,869 | 6,693 | 4,651 | 2,023 | 180 | 314 | 907 | 34,637 |

*–The catch of billfish by driftnet was included in the catch by gillnet until 1989

Source: Annual Statistical Report on Fisheries and Aquacultural Production, Fisheries Agency of Japan

Appendix 18. Japanese distant-water billfish longliner catch, by species and quantity, 1980, 1985-94.

| Year | Striped Marlin | Swordfish | Blue Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | |
| 1980 | 7,527 | 6,487 | 8,586 | 759 | 23,359 | 28% |
| 1985 | 4,864 | 10,741 | 9,977 | 598 | 26,180 | 41% |
| 1986 | 5,635 | 8,946 | 9,042 | 483 | 24,106 | 37% |
| 1987 | 6,711 | 7,883 | 10,664 | 452 | 25,710 | 31% |
| 1988 | 7,843 | 11,115 | 11,269 | 628 | 30,855 | 36% |
| 1989 | 5,430 | 8,356 | 6,570 | 399 | 20,755 | 40% |
| 1990 | 3,095 | 8,279 | 6,247 | 377 | 17,998 | 46% |
| 1991 | 3,473 | 8,095 | 6,577 | 378 | 18,523 | 44% |
| 1992 | 3,643 | 8,804 | 7,774 | 430 | 20,651 | 43% |
| 1993 | 4,032 | 8,367 | 7,267 | 390 | 20,056 | 42% |
| 1994 | 3,663 | 7,955 | 8,251 | 391 | 20,260 | 39% |

Source: *Gyogyo Yoshoku Seisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 19. Japanese offshore billfish longliner catch, by species and quantity, 1980, 1985-94.

| Year | Striped Marlin | Swordfish | Blue Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | |
| 1980 | 2,022 | 4,071 | 3,953 | 309 | 10,355 | 39% |
| 1985 | 2,215 | 7,220 | 3,823 | 103 | 13,361 | 54% |
| 1986 | 3,225 | 6,589 | 4,104 | 205 | 14,123 | 47% |
| 1987 | 1,482 | 6,786 | 2,680 | 113 | 11,061 | 61% |
| 1988 | 2,309 | 6,132 | 3,026 | 119 | 11,586 | 53% |
| 1989 | 1,609 | 4,030 | 2,450 | 80 | 8,169 | 49% |
| 1990 | 1,174 | 4,516 | 2,384 | 22 | 8,096 | 56% |
| 1991 | 1,383 | 3,385 | 1,920 | 56 | 6,744 | 50% |
| 1992 | 1,142 | 4,077 | 1,507 | 28 | 6,754 | 60% |
| 1993 | 1,290 | 4,683 | 1,962 | 16 | 7,951 | 59% |
| 1994 | 1,195 | 3,734 | 1,743 | 21 | 6,693 | 56% |

Source: *Gyogyo Yoshoku Seisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 20. Japanese coastal billfish longliner catch, by species and quantity, 1980, 1985-94.

| Year | Striped Marlin | Swordfish | Blue Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | |
| 1980 | 607 | 824 | 702 | 196 | 2,329 | 35% |
| 1985 | 711 | 986 | 1,037 | 176 | 2,904 | 34% |
| 1986 | 901 | 966 | 898 | 191 | 2,950 | 33% |
| 1987 | 1,187 | 819 | 1,526 | 393 | 3,925 | 21% |
| 1988 | 752 | 665 | 1,454 | 106 | 2,977 | 22% |
| 1989 | 1,081 | 742 | 1,261 | 52 | 3,136 | 24% |
| 1990 | 1,125 | 687 | 1,204 | 186 | 3,202 | 21% |
| 1991 | 1,197 | 799 | 1,342 | 305 | 3,643 | 22% |
| 1992 | 1,247 | 1,173 | 1,657 | 216 | 4,293 | 27% |
| 1993 | 1,723 | 1,394 | 2,092 | 189 | 5,398 | 26% |
| 1994 | 1,284 | 1,357 | 1,833 | 177 | 4,651 | 29% |

Source: *Gyogyo Yoshoku Suisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 21. Japan. Billfish driftnet catch, 1990-94.

| Year | Tunas | Billfish | Skipjacks | Total | Billfish as % of Total |
|---|---|---|---|---|---|
| | | | *Metric tons* | | |
| 1990 | 10,246 | 3,296 | 8,326 | 21,868 | 15% |
| 1991 | 2,499 | 2,032 | 10,160 | 14,691 | 14% |
| 1992 | 2,732 | 2,296 | 6,602 | 11,630 | 20% |
| 1993 | 468 | 1,272 | 818 | 2,558 | 50% |
| 1994 | 466 | 2,023 | 642 | 3,131 | 65% |

Source: *Gyogyo Yoshoku Suisan Tokei Nenpo,* Statistics and Information Department, Ministry of Agriculture, Forestry, and Fisheries.

Appendix 22. Japan. Indian Ocean catch of tuna and billfish by longliners, by species and quantity, 1989-93.

| Species | Year | | | | |
|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 |
| | *Metric tons* | | | | |
| **Indian Ocean** | | | | | |
| Albacore | 776 | 1,066 | 830 | 1,040 | 895 |
| Bigeye | 6,905 | 9,309 | 7,140 | 4,786 | 6,911 |
| Skipjack | 2 | 3 | 1 | -- | -- |
| Southern bluefin | 8,915 | 4,338 | 2,475 | 2,949 | 1,822 |
| Yellowfin | 3,568 | 6,192 | 3,847 | 3,843 | 3,377 |
| Swordfish | 667 | 853 | 410 | 1,151 | 882 |
| Blue Marlin | 372 | 506 | 227 | 292 | 244 |
| Black Marlin | 116 | 116 | 54 | 69 | 50 |
| Striped Marlin | 157 | 149 | 152 | 180 | 93 |
| Sailfish | 33 | 35 | 11 | 15 | 8 |
| Others | -- | -- | -- | -- | -- |
| Grand Total | 21,511 | 22,567 | 15,147 | 14,325 | 14,282 |

Source: Indo-Pacific Tuna Programme

Appendix 23. Japan. Longliner billfish catch in the western Indian Ocean (FAO area 51), by species and quantity, 1980, 1985-93.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | | |
| 1980 | 257 | 84 | 449 | 33 | 172 | 995 | 17% |
| 1985 | 1,021 | 160 | 545 | 101 | 1,074 | 2,901 | 37% |
| 1986 | 848 | 132 | 629 | 94 | 861 | 2,564 | 34% |
| 1987 | 670 | 116 | 293 | 47 | 773 | 1,899 | 41% |
| 1988 | 586 | 84 | 170 | 39 | 830 | 1,709 | 49% |
| 1989 | 236 | 41 | 72 | 16 | 498 | 863 | 58% |
| 1990 | 247 | 41 | 52 | 21 | 530 | 891 | 59% |
| 1991 | 155 | 25 | 105 | 8 | 382 | 675 | 57% |
| 1992 | 250 | 50 | 98 | 11 | 1039 | 1,448 | 72% |
| 1993 | 188 | 32 | 59 | 6 | 514 | 799 | 64% |

Source: Indo-Pacific Tuna Development and Management Programme, *Indian Ocean and Southeast Asian Tuna Fisheries Data Summary for 1993.*

Appendix 24. Japan. Longliner billfish catch in the eastern Indian Ocean (FAO area 57), by species and quantity, 1980, 1985-93.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | | |
| 1980 | 532 | 298 | 764 | 50 | 274 | 1,918 | 14% |
| 1985 | 564 | 414 | 501 | 50 | 591 | 2,120 | 28% |
| 1986 | 480 | 305 | 475 | 49 | 289 | 1,598 | 18% |
| 1987 | 261 | 154 | 368 | 14 | 344 | 1,141 | 30% |
| 1988 | 221 | 139 | 139 | 15 | 265 | 779 | 34% |
| 1989 | 136 | 75 | 85 | 17 | 169 | 482 | 35% |
| 1990 | 259 | 75 | 97 | 14 | 323 | 768 | 42% |
| 1991 | 72 | 29 | 47 | 3 | 28 | 179 | 16% |
| 1992 | 42 | 19 | 82 | 4 | 112 | 259 | 43% |
| 1993 | 56 | 18 | 34 | 2 | 368 | 478 | 77% |

Source: Indo-Pacific Tuna Development and Management Programme, *Indian Ocean and Southeast Asian Tuna Fisheries Data Summary for 1993.*

Appendix 25. Japan. Pacific Ocean catch of tuna by distant-water longliners, by species and quantity, 1989-94.

| Species | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| | *Metric tons* | | | | | |
| **Pacific Ocean** | | | | | | |
| Albacore | 4,581 | 4,559 | 3,266 | 3,767 | 7,177 | 7,380 |
| Bigeye | 21,307 | 26,775 | 17,468 | 18,857 | 27,004 | 23,493 |
| Yellowfin | 22,256 | 23,301 | 16,672 | 17,638 | 23,339 | 28,130 |
| Others | 7,583 | 6,287 | 5,792 | 6,332 | 10,619 | 10,260 |
| Grand Total | 55,727 | 60,922 | 43,198 | 46,594 | 68,139 | 69,263 |

Source: *Tuna Fishery Yearbook 1995*, South Pacific Commission..
Note: Statistics for 1989-92 were determined from data provided to SPC by the Fisheries Agency of Japan. The catch data provided by the Fisheries Agency of Japan are aggregated by 5 degrees by 5 degrees by month; the catch statistics in this table are for an area approximating the SPC statistical area. The catch data provided by the Fisheries Agency of Japan are given in numbers of fish; these were converted to metric tons using average weight statistics. The catch estimates for 1993 and 1994 were provided by the National Research Institute of Far Seas Fisheries.

Appendix 26. Japan. Atlantic and Mediterranean catches of tuna and billfish by longliners, by species and quantity, 1989-94.

| Species | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994* |
| | *Metric tons* | | | | | |
| **Atlantic Ocean** | | | | | | |
| Albacore | 1,214 | 1,324 | 1,346 | 1,048 | 951 | 988 |
| Bigeye | 39,419 | 35,024 | 29,487 | 34,128 | 35,053 | 38,655 |
| Bluefin | 2,396 | 2,014 | 3,669 | 3,862 | 5,306 | 2,502 |
| Southern bluefin | 625 | 1,202 | 1,331 | 525 | 1,688 | 502 |
| Yellowfin | 6,971 | 5,919 | 4,718 | 3,715 | 3,096 | 4,733 |
| Swordfish | 5,592 | 7,305 | 4,687 | 3,539 | 6,382 | 5,768 |
| Blue Marlin** | 1,555 | 1,216 | 905 | 1,017 | 928 | 1,483 |
| Black Marlin*** | -- | -- | -- | -- | -- | 11 |
| White Marlin | 146 | 126 | 121 | 248 | 82 | 98 |
| Sailfish**** | 78 | 88 | 88 | 43 | 60 | 51 |
| Spearfish***** | -- | -- | -- | -- | -- | 37 |
| Others | 390 | 538 | 443 | 265 | 815 | 213 |
| Total Atlantic | 58,386 | 54,756 | 46,795 | 48,390 | 52,120 | 55,041 |
| **Mediterranean** | | | | | | |
| Bluefin | 127 | 172 | 85 | 123 | 793 | 536 |
| Swordfish | 1 | 2 | 1 | 2 | 4 | 3 |
| Bigeye | -- | -- | 2 | -- | -- | -- |
| Other | -- | -- | -- | -- | -- | -- |
| Total Mediterranean | 128 | 174 | 88 | 125 | 797 | 539 |
| Grand Total | 58,514 | 54,930 | 46,883 | 48,515 | 52,917 | 55,580 |

*--Preliminary, **--Includes a minor amount of black marlin up to 1993, ***--Black Marlin is separated from blue marlin in 1994, ****-- Includes shortbill spearfish up to 1993, *****--Spearfish is separated from sailfish in 1994. Source: *Nat. Rep. of Japan*, NIFSF.

Appendix 27. Japan. Catch by longliners fishing in the Atlantic and Mediterranean Oceans, by species and quantity, 1980, 1985-94.

| Year | Swordfish | Billfish | Total | Swordfish as % of Total |
|---|---|---|---|---|
| | | *Metric tons* | | |
| 1980 | 3197 | 469 | 3,666 | 87% |
| 1985 | 5,548 | 1,348 | 6,896 | 80% |
| 1986 | 3,727 | 737 | 4,464 | 83% |
| 1987 | 2,293 | 617 | 2,910 | 79% |
| 1988 | 4,051 | 1,046 | 5,097 | 79% |
| 1989 | 5,592 | 1,780 | 7,372 | 76% |
| 1990 | 7,307 | 1,431 | 8,738 | 84% |
| 1991 | 4,689 | 1,108 | 5,797 | 81% |
| 1992 | 3,659 | 876 | 4,535 | 81% |
| 1993 | 6,386 | 1,192 | 7,578 | 84% |
| 1994* | 5,768 | 1,680 | 7,448 | 77% |

*--Preliminary.

Source: International Commission for the Conservation of Atlantic Tunas, *Statistical Bulletin*, Vol. 24-1993
1994 data from *National Report of Japan*, National Insitute of Far Seas Fisheries.

Appendix 28. Japanese swordfish catch, by major FAO fishing area, 1980, 1985-94

| FAO Area | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| | *Metric tons* | | | | | | | | | | |
| Pacific Ocean | | | | | | | | | | | |
| Area 71 | 1,214 | 1,104 | 1,034 | 787 | 627 | 921 | 718 | 503 | 837 | 748 | 679 |
| Area 61 | 6,323 | 8,324 | 8,889 | 8,382 | 7,977 | 6,251 | 5,561 | 4,684 | 7,840 | 9,970 | 8,760 |
| Area 77 | 3,299 | 2,416 | 2,767 | 3,889 | 4,053 | 3,480 | 3,173 | 2,837 | 3,712 | 2,691 | 1,613 |
| Area 81 | 583 | 823 | 1,114 | 1,240 | 1,845 | 1,218 | 1,114 | 1,124 | 2,178 | 1,332 | 1,061 |
| Area 67 | -- | 162 | 25 | 28 | 70 | 86 | 12 | 30 | 25 | -- | 6 |
| Area 87 | 534 | 254 | 422 | 541 | 924 | 411 | 763 | 758 | 1,027 | 717 | 689 |
| Total Pacific | 11,953 | 13,083 | 14,251 | 14,867 | 15,496 | 12,367 | 11,341 | 9,936 | 15,619 | 15,458 | 12,808 |
| Indian Ocean | | | | | | | | | | | |
| Area 51 | 172 | 1,147 | 870 | 776 | 829 | 504 | 592 | 380 | 1,023 | 664 | 930 |
| Area 57 | 274 | 564 | 315 | 376 | 265 | 178 | 219 | 260 | 122 | 285 | 363 |
| Total Indian | 446 | 1,711 | 1,185 | 1,152 | 1,094 | 682 | 811 | 640 | 1,145 | 949 | 1,293 |
| Atlantic Ocean | | | | | | | | | | | |
| Area 21 | 367 | 245 | 272 | 164 | 197 | 174 | 200 | 183 | 199 | 106 | 62 |
| Area 27 | 15 | 33 | 18 | 32 | 37 | 38 | 36 | 94 | 85 | 41 | 42 |
| Area 31 | 3 | 86 | 28 | 20 | 17 | 152 | 64 | 40 | 35 | 33 | 33 |
| Area 34 | 714 | 1,704 | 444 | 790 | 1,420 | 1,908 | 2,230 | 936 | 1,277 | 2,338 | 1,993 |
| Area 37 | 1 | 15 | 7 | 3 | 4 | 2 | 2 | 1 | 2 | 5 | 4 |
| Area 41 | 136 | 342 | 574 | 593 | 772 | 718 | 1,253 | 941 | 907 | 472 | 577 |
| Area 47 | 1,040 | 2,423 | 1,553 | 944 | 1,668 | 2,270 | 2,106 | 1,570 | 1,883 | 2,406 | 2,964 |
| Total Atlantic | 2,276 | 4,848 | 2,896 | 2,546 | 4,115 | 5,262 | 5,891 | 3,765 | 4,388 | 5,401 | 5,675 |
| Grand Total | 14,675 | 19,642 | 18,332 | 18,565 | 20,705 | 18,311 | 18,043 | 14,341 | 21,152 | 21,808 | 19,776 |

Source: United Nations Food and Agriculture Organization, *Yearbook of Fishery Statistics*.

Appendix 29. Japan. Principal ports where billfish were landed, by quantity (metric tons), 1993.

| Fishing Port | Swordfish | | Striped Marlin | | Blue Marlin | |
|---|---|---|---|---|---|---|
| | Fresh | Frozen | Fresh | Frozaen | Fresh | Frozen |
| Kesenuma, MIYAGI | 5,171 | 19 | 1,611 | 122 | 370 | 39 |
| Ishinomaki, MIYAGI | 6 | – | 23 | 4 | 9 | – |
| Shiogama, MIYAGI | 250 | 10 | 475 | 22 | 208 | 19 |
| Choshi, CHIBA | 373 | – | 511 | – | 201 | – |
| Misaki, KANAGAWA | – | 1,098 | – | 911 | 1 | 1,806 |
| Shimizu, SHIZUOKA | 2 | 2,935 | – | 1,477 | – | 2,737 |
| Yaizu, SHIZUOKA | 18 | 453 | 50 | 150 | 74 | 405 |
| Katsuura,WAKAYAMA | 453 | 54 | 363 | 61 | 906 | 201 |
| Naha, OKINAWA | 171 | – | 104 | – | 993 | 860 |
| Other | 56 | 3 | 218 | 10 | 12 | 40 |
| Total | 6,500 | 4,572 | 3,355 | 2,757 | 2,774 | 6,107 |

Source: U.S. Embassy Tokyo.

Appendix 30. Japan. Billfish processing, on shore and at sea, by quantity (metric tons),1989-94.

| Type of Processing/Species | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| At-sea processing (gilled, gutted, and frozen) | | | | | | |
| Swordfish | 9,535 | 9,707 | 8,979 | 9,963 | 9,872 | 9,027 |
| Striped Marlin | 5,692 | 3,372 | 3,819 | 3,851 | 4,275 | 3,895 |
| Blue Marlin | 7,181 | 6,844 | 6,914 | 7,774 | 7,562 | 8,315 |
| Sailfish | 399 | 349 | 368 | 401 | 359 | 363 |
| Total | 22,807 | 20,272 | 20,080 | 21,989 | 22,068 | 21,600 |
| On-shore processing | | | | | | |
| Billfish | 3,204 | 3,929 | 2,777 | 2,529 | 2,449 | 2,547 |
| Grand Total | 26,011 | 24,201 | 22,857 | 24,518 | 24,517 | 24,147 |

Source: Annual Statistical Report on Fishery Products Distribution, 1993--Ministry of Agriculture, Forestry, and Fisheries.

Appendix 31. Japan. Swordfish/Tuna Industry Associations

Japan Marine Products Importers Association
Address: c/o Kamakurabashi Bldg. (1st Floor)
1-7-1, Uchi Kanda, Chiyoda-ku, Tokyo 101, Japan
TEL: 03-5280-2891
FAX: 03-5280-2892

Federation of Japan Tuna Fisheries Cooperative Associations
(Group of Distant Water Tuna Longliners)
Address: 2-3-22, Kudan Kita, Chiyoda-ku, Tokyo 102, Japan
TEL: 03-3264-6167
FAX 03-3234-7455

All Japan Offshore Tuna Fisheries Association
Address: c/o Kato Bldg.
1-5-4, Uchikanda, Chiyoda-ku, Tokyo 101, Japan
TEL: 03-3295-3721
FAX: 03-3295-3740

## Appendices--Prices

Appendix 32. Japan. Average market price of fresh and frozen swordfish at landing markets.

| Commodity | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995* |
| | Yen per kilogram | | | | | | | | | | |
| Fresh | 759 | 750 | 789 | 757 | 768 | 882 | 980 | 880 | 785 | 800 | 817 |
| Frozen | NA | NA | NA | 583 | 599 | 638 | 762 | 707 | 662 | 576 | 587 |

Appendix 33. Japan. Average market price of fresh and frozen bluefin tuna at landing markets.

| Commodity | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995* |
| | Yen per kilogram | | | | | | | | | | |
| Fresh | 3,448 | 2,998 | 3,598 | 4,112 | 3,931 | 4,565 | 3,336 | 4,304 | 4,411 | 3,215 | 2,900 |
| Frozen | 3,036 | 4,178 | 3,759 | 4,343 | 4,896 | 4,677 | 4,183 | 3,663 | 3,772 | 3,174 | 2,578 |

Appendix 34. Japan. Average market price of fresh and frozen yellowfin tuna at landing markets.

| Commodity | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995* |
| | Yen per kilogram | | | | | | | | | | |
| Fresh | 759 | 728 | 661 | 713 | 827 | 840 | 799 | 777 | 916 | 947 | 700 |
| Frozen | 635 | 526 | 511 | 538 | 769 | 579 | 486 | 625 | 659 | 555 | 524 |

Appendix 35. Japan. Average market price of fresh and frozen bigeye tuna at landing markets.

| Commodity | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995* |
| | Yen per kilogram | | | | | | | | | | |
| Fresh | 1,030 | 1,387 | 1,199 | 1,522 | 1,591 | 1,638 | 1,580 | 1,553 | 1,556 | 1,553 | 1,032 |
| Frozen | 917 | 861 | 836 | 1,020 | 1,207 | 1,141 | 1,009 | 1,116 | 1,177 | 1,065 | 761 |

*- Through October 1995

Source: Monthly Statistics of Agriculture, Forestry, and Fisheries, MAFF.

Appendix 36. Japan. Imports of billfish (including swordfish), by year, quantity@ and value%, 1986-95.*

| Country | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val | Qty | Val |
| Taiwan | 7,669 | 25,400 | 7,635 | 30,293 | 5,818 | 22,696 | 5,982 | 20,719 | 6,415 | 21,577 | 6,582 | 27,242 | 9,008 | 40,575 | 9,285 | 41,254 | 7,721 | 35,945 | 9,735 | 43,310 |
| Korea | 6,279 | 14,160 | 7,517 | 17,712 | 7,043 | 21,248 | 6,843 | 28,422 | 5,233 | 18,878 | 5,575 | 19,826 | 5,315 | 20,911 | 4,117 | 14,314 | 3,476 | 11,232 | 2,886 | 9,483 |
| Panama | 927 | 2,574 | 1,110 | 3,043 | 1,206 | 3,372 | 848 | 2,205 | 1,181 | 3,204 | 1,098 | 3,008 | 1,475 | 4,750 | 1,520 | 4,718 | 1,266 | 3,839 | 885 | 2,631 |
| Honduras | 108 | 234 | 293 | 915 | 373 | 783 | 908 | 2,184 | 977 | 4,019 | 1,298 | 6,600 | 1,157 | 4,211 | 669 | 1,786 | 1,134 | 3,293 | 1,067 | 3,605 |
| Indonesia | 644 | 1,443 | 849 | 2,039 | 1,109 | 2,438 | 1,649 | 3,626 | 1,129 | 2,491 | 1,048 | 2,578 | 1,333 | 3,535 | 917 | 3,076 | 847 | 3,113 | 867 | 3,423 |
| Singapore | 266 | 508 | 399 | 1,351 | 504 | 1,496 | 359 | 1,026 | 302 | 751 | 455 | 1,827 | 1,009 | 5,090 | 543 | 2,363 | 676 | 2,817 | 2,406 | 10,406 |
| St. Vincent | 17 | 42 | – | – | 4 | 10 | 4 | 8 | 43 | 74 | 128 | 295 | 255 | 747 | 338 | 951 | 347 | 958 | 185 | 460 |
| Uruguay | 642 | 2,161 | 523 | 2,217 | 350 | 1,618 | 350 | 1,017 | 262 | 1,014 | 246 | 979 | 181 | 678 | 148 | 455 | 296 | 489 | 258 | 399 |
| South Africa | 43 | 60 | 155 | 189 | 141 | 188 | 285 | 540 | 404 | 615 | 669 | 1,745 | 460 | 1,634 | 223 | 651 | 384 | 548 | 337 | 661 |
| Philippines | 32 | 119 | 66 | 233 | 166 | 744 | 387 | 1,653 | 382 | 1,528 | 643 | 3,132 | 329 | 1,964 | 319 | 1,564 | 256 | 1,407 | 196 | 1,031 |
| Trinidad | 21 | 30 | – | – | – | – | – | – | – | – | 333 | 556 | 212 | 396 | 1,053 | 5,031 | 49 | 90 | 392 | 1,987 |
| Others | 2,823 | 15,951 | 2,297 | 17,774 | 2,793 | 18,277 | 3,326 | 24,200 | 3,749 | 41,904 | 4,379 | 48,148 | 3,197 | 36,525 | 1,846 | 7,074 | 1,944 | 8,607 | 2,285 | 13,530 |
| Total | 19,471 | 62,682 | 20,844 | 75,766 | 19,507 | 72,870 | 20,941 | 85,600 | 20,077 | 96,055 | 22,454 | 115,936 | 23,931 | 121,016 | 20,978 | 83,237 | 18,396 | 72,338 | 21,499 | 90,926 |

*–Includes frozen tuna fillets 1985-92.
@-Quantity is in metric tons.
%-Value in in 1,000 U.S. dollars FOB Japan.
Source: Japan Marine Products Importers Association

Appendix 37. Japan. Imports of fresh or chilled billfish (including swordfish), by exporting country and quantity, 1986-95.

| Country of Origin | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *Metric tons* | | | | | |
| Taiwan | 1,663 | 1,651 | 1,130 | 798 | 1,108 | 1,380 | 1,524 | 987 | 1,061 | 1,179 |
| Philippines | 32 | 54 | 164 | 387 | 370 | 491 | 256 | 315 | 253 | 194 |
| Guam | 0.7 | 40 | 8 | 7 | 34 | 41 | 40 | 69 | 160 | 332 |
| Indonesia | – | 2 | 17 | 59 | 28 | 64 | 40 | 29 | 28 | 21 |
| Malaysia | – | 0.6 | 9 | 50 | 37 | 29 | 30 | 81 | 101 | 85 |
| New Caledonia | – | – | 10 | 23 | 26 | 21 | 14 | 17 | 25 | 16 |
| United States | 0.3 | – | 6 | 28 | 16 | 9 | 19 | 7 | 14 | 10 |
| Fiji | – | – | – | 0.6 | 5 | 15 | 15 | 39 | 103 | 103 |
| Palau | – | – | – | – | 8 | 34 | 6 | 38 | 12 | 14 |
| Singapore | 0.4 | 7 | 27 | 29 | 3 | 7 | 6 | 2 | 0.5 | 3 |
| Other | 4.6 | 3.4 | 14 | 5 4 | 10 | 32 | 28 | 98 | 98 | 91 |
| Total | 1,701 | 1,758 | 1,385 | 1,387 | 1,645 | 2,123 | 1,978 | 1,682 | 1,855 | 2,048 |

Source: Japan Marine Products Importers Association

Appendix 38. Japan. Imports of fresh or chilled billfish (including swordfish), by exporting country and value, 1986-95.

| Country of Origin | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *U.S. Dollars* | | | | | |
| Taiwan | 9,189,982 | 9,678,318 | 7,346,527 | 5,747,280 | 7,919,912 | 10,868,810 | 11,548,079 | 9,541,176 | 10,387,184 | 10,898,090 |
| Philippines | 118,725 | 216,074 | 736,134 | 1,652,677 | 1,458,533 | 2,166,150 | 1,268,449 | 1,551,586 | 1,392,094 | 1,021,500 |
| Guam | 1,647 | 90,056 | 31,132 | 37,821 | 225,169 | 188,287 | 239,814 | 439,779 | 991,517 | 2,175,199 |
| Indonesia | – | 17,723 | 77,869 | 249,904 | 108,172 | 256,697 | 171,897 | 165,260 | 189,416 | 147,815 |
| Malaysia | – | 4,840 | 61,144 | 316,783 | 207,391 | 168,833 | 156,093 | 518,590 | 655,207 | 537,497 |
| New Caledonia | – | – | 68,453 | 143,022 | 167,175 | 118,761 | 104,797 | 135,083 | 222,139 | 145,182 |
| United States | 1,927 | – | 18,017 | 206,479 | 119,606 | 70,825 | 163,879 | 111,351 | 166,221 | 90,449 |
| Fiji | – | – | – | 3,914 | 21,394 | 95,338 | 97,321 | 297,160 | 738,445 | 833,943 |
| Palau | – | – | – | – | 39,046 | 162,804 | 40,111 | 196,286 | 82,794 | 131,310 |
| Singapore | 1,340 | 26,756 | 137,694 | 162,427 | 15,461 | 63,106 | 34,461 | 14,776 | 6,541 | 24,491 |
| Other | 22,388 | 34,616 | 79,344 | 36,898 | 53,600 | 171,185 | 231,834 | 827,694 | 757,303 | 949,525 |
| Total | 9,336,009 | 10,068,383 | 8,556,314 | 8,557,205 | 10,335,459 | 14,330,796 | 14,056,735 | 13,798,741 | 15,588,861 | 16,955,001 |

Source: Japan Marine Products Importers Association

Appendix 39. Japan. Imports of frozen billfish (including swordfish)*, by exporting country and quantity, 1986-95.

| Country of Origin | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *Metric tons* | | | | | |
| Republic of Korea | 5,753 | 6,893 | 5,525 | 4,516 | 3,681 | 4,290 | 4,236 | 3,828 | 3,209 | 2,690 |
| Taiwan | 5,741 | 5,033 | 3,550 | 4,221 | 5,061 | 4,887 | 7,364 | 7,845 | 6,302 | 8,160 |
| Panama | 816 | 968 | 1,128 | 763 | 1,043 | 1,000 | 1,352 | 1,418 | 1,159 | 788 |
| Indonesia | 500 | 579 | 825 | 1,232 | 701 | 604 | 703 | 537 | 323 | 266 |
| Honduras | 99 | 234 | 327 | 684 | 705 | 939 | 982 | 584 | 959 | 963 |
| Singapore | 249 | 348 | 385 | 264 | 203 | 360 | 815 | 450 | 594 | 2,330 |
| South Africa | 43 | 149 | 141 | 269 | 402 | 636 | 366 | 210 | 380 | 331 |
| French Pacific Territories | – | 119 | 370 | 287 | 448 | 472 | 155 | 35 | 40 | – |
| New Caledonia | 187 | 199 | 160 | 192 | 156 | 253 | 129 | 101 | 128 | 43 |
| Uruguay | 202 | 108 | 39 | 82 | 104 | 126 | 84 | 123 | 296 | 253 |
| Ecuador | 59 | 201 | 77 | 132 | 324 | 360 | 264 | 225 | 144 | 133 |
| Brazil | 2 | 9 | 2 | – | – | 1 | 192 | 219 | – | – |
| Trinidad & Tobago | 21 | – | – | – | – | 333 | 212 | 1,035 | 49 | 343 |
| St. Vincent | 17 | – | 4 | 3 | 40 | 122 | 241 | 319 | 329 | 177 |
| Cuba | 825 | 79 | 204 | 250 | – | – | – | – | – | – |
| Other | 733 | 540 | 713 | 1,038 | 687 | 583 | 394 | 580 | 788 | 1,191 |
| Total | 15,247 | 15,459 | 13,450 | 13,933 | 13,555 | 14,966 | 17,489 | 17,509 | 14,700 | 17,668 |

Source: Japan Marine Products Importers Association

Appendix 40. Japan. Imports of frozen billfish (including swordfish); by exporting country and value, 1986-95.

| Country of Origin | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *U.S. Dollars* | | | | | |
| Republic of Korea | 11,729,368 | 15,341,675 | 11,554,273 | 10,753,852 | 7,808,876 | 10,358,036 | 11,909,004 | 13,090,165 | 10,047,994 | 8,604,590 |
| Taiwan | 15,207,529 | 15,920,199 | 10,031,259 | 11,421,857 | 12,667,283 | 14,605,078 | 28,077,427 | 29,414,465 | 23,951,831 | 33,495,816 |
| Panama | 2,293,334 | 2,647,547 | 2,795,945 | 1,870,854 | 2,332,515 | 2,564,409 | 4,182,932 | 4,273,875 | 3,351,608 | 2,169,035 |
| Indonesia | 990,322 | 993,676 | 1,328,947 | 2,170,882 | 1,210,444 | 1,200,397 | 1,380,817 | 1,504,173 | 849,252 | 777,244 |
| Honduras | 206,049 | 505,751 | 601,831 | 1,446,244 | 1,286,941 | 2,530,175 | 2,771,815 | 1,406,623 | 2,498,600 | 3,092,964 |
| Singapore | 451,598 | 1,087,813 | 925,319 | 580,804 | 436,200 | 1,257,801 | 2,918,918 | 1,874,901 | 2,386,445 | 9,950,578 |
| South Africa | 60,454 | 181,563 | 188,100 | 515,109 | 611,257 | 1,550,594 | 1,022,489 | 584,886 | 541,132 | 651,730 |
| French Pacific Territories | – | 176,917 | 500,989 | 411,716 | 849,657 | 990,646 | 279,359 | 54,133 | 66,058 | – |
| New Caledonia | 594,896 | 681,540 | 398,226 | 553,211 | 421,568 | 899,970 | 365,238 | 342,933 | 547,409 | 130,251 |
| Uruguay | 286,229 | 148,355 | 51,940 | 106,843 | 190,635 | 325,859 | 161,690 | 312,065 | 488,522 | 371,034 |
| Ecuador | 132,179 | 389,183 | 174,574 | 389,756 | 854,825 | 937,969 | 719,055 | 776,948 | 1,085,739 | 688,446 |
| Brazil | 4,573 | 34,076 | 4,267 | – | – | 1,603 | 354,116 | 536,540 | – | – |
| Trinidad & Tobago | 29,928 | – | – | – | – | 556,429 | 395,942 | 4,948,627 | 90,284 | 1,736,103 |
| St. Vincent | 41,762 | – | 10,367 | 5,513 | 67,177 | 271,486 | 690,781 | 869,750 | 873,617 | 419,743 |
| Cuba | 860,022 | 86,555 | 808,661 | 665,351 | – | – | – | – | – | – |
| Other | 1,098,824 | 1,135,917 | 1,610,195 | 2,242,909 | 1,358,931 | 1,193,485 | 990,848 | 1,405,808 | 1,916,036 | 3,765,040 |
| Total | 33,987,067 | 39,330,767 | 30,984,893 | 33,134,901 | 30,096,309 | 39,243,937 | 56,220,431 | 61,395,892 | 48,694,527 | 65,852,574 |

Source: Japan Marine Products Importers Association

Appendix 41. Japan. Imports of frozen tuna and billfish (including swordfish) fillet imports, by exporting country and quantity, 1986-95.#

| Country of Origin | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *Metric tons* | | | | | |
| **Republic of Korea** | 522 | 622 | 1,518 | 2,327 | 1,552 | 1,285 | 1,079 | 289 | 267 | 196 |
| **Taiwan** | 265 | 951 | 1,138 | 963 | 246 | 315 | 120 | 453 | 358 | 396 |
| **Singapore** | 17 | 44 | 92 | 66 | 96 | 88 | 188 | 91 | 81 | 73 |
| **Italy** | 198 | 135 | 90 | 214 | 160 | 197 | 264 | – | – | – |
| **Spain** | 432 | 618 | 578 | 374 | 1,058 | 531 | 674 | – | 4 | – |
| **Portugal** | – | 4 | – | – | 85 | 207 | 194 | 82 | 59 | 30 |
| **United States** | 142 | 63 | 73 | 122 | 114 | 11 | 71 | 5 | 5 | 38 |
| **Argentina** | 152 | 90 | 288 | 137 | 92 | 54 | – | – | – | – |
| **Uruguay** | 440 | 415 | 311 | 268 | 158 | 120 | 97 | 25 | – | 5 |
| **Chile** | – | – | 8 | 32 | 40 | 85 | 70 | 17 | 4 | 10 |
| **Panama** | 111 | 142 | 78 | 85 | 138 | 98 | 123 | 102 | 107 | 97 |
| **Indonesia** | 144 | 268 | 267 | 358 | 400 | 380 | 590 | 351 | 496 | 580 |
| **Honduras** | 9 | 59 | 46 | 222 | 272 | 359 | 175 | 85 | 175 | 104 |
| **Morocco** | – | 60 | 15 | 3 | 54 | 357 | 151 | – | – | – |
| **Malaysia** | – | – | – | 73 | 148 | 504 | 362 | 127 | 172 | 21 |
| **Other** | 91 | 156 | 170 | 377 | 264 | 774 | 306 | 160 | 113 | 233 |
| **Total** | 2,523 | 3,627 | 4,672 | 5,621 | 4,877 | 5,365 | 4,464 | 1,787 | 1,841 | 1,783 |

# 1993-95 Tuna fillets excluded from this category.
Source: Japan Marine Products Importers Association

Appendix 42 Japan Imports of frozen tuna and billfish (including swordfish) fillets, by exporting country and value, 1986-95.#

| Country of Origin | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *U.S. Dollars* | | | | | |
| Republic of Korea | 2,414,886 | 2,352,496 | 9,693,608 | 17,668,512 | 11,069,552 | 9,468,082 | 9,002,175 | 1,223,664 | 1,184,208 | 874,901 |
| Taiwan | 1,002,318 | 4,694,549 | 5,318,150 | 3,549,627 | 989,569 | 1,768,403 | 949,751 | 2,298,647 | 1,605,660 | 1,915,931 |
| Singapore | 55,320 | 236,580 | 432,627 | 282,575 | 299,322 | 506,461 | 2,136,377 | 472,896 | 423,498 | 430,842 |
| Italy | 2,560,597 | 2,211,970 | 1,541,301 | 3,594,435 | 3,342,364 | 3,946,051 | 5,774,400 | – | – | – |
| Spain | 5,891,052 | 8,531,484 | 8,506,709 | 5,436,953 | 22,877,444 | 12,869,472 | 15,673,073 | – | 9,155 | – |
| Portugal | – | 68,722 | – | – | 492,410 | 3,437,502 | 2,446,166 | 386,767 | 232,448 | 147,190 |
| United States | 3,274,280 | 2,032,835 | 1,963,962 | 4,183,566 | 4,051,660 | 219,619 | 2,695,209 | 26,239 | 34,913 | 152,793 |
| Argentina | 547,301 | 383,085 | 1,526,451 | 691,380 | 403,842 | 306,237 | – | – | – | – |
| Uruguay | 1,874,492 | 2,069,108 | 1,565,837 | 910,324 | 822,966 | 653,581 | 516,058 | 142,952 | – | 27,713 |
| Chile | – | – | 45,229 | 115,790 | 105,402 | 294,196 | 325,503 | 71,207 | 25,251 | 45,258 |
| Panama | 280,433 | 395,371 | 575,706 | 334,305 | 871,536 | 443,811 | 566,511 | 443,720 | 487,453 | 462,116 |
| Morocco | – | 897,686 | 222,456 | 63,697 | 2,121,427 | 7,647,430 | 3,436,463 | – | – | – |
| Indonesia | 452,841 | 1,027,212 | 1,031,163 | 1,205,014 | 1,171,921 | 1,120,567 | 1,982,227 | 1,406,760 | 2,074,315 | 2,497,474 |
| Honduras | 27,492 | 409,060 | 180,794 | 733,883 | 2,731,884 | 4,069,827 | 1,439,015 | 379,342 | 793,907 | 512,098 |
| Malaysia | – | – | — | 233,096 | 539,938 | 1,994,972 | 1,168,405 | 565,744 | 775,698 | 88,176 |
| Other | 977,972 | 1,057,176 | 724,467 | 4,904,279 | 3,731,870 | 13,615,404 | 2,627,070 | 624,219 | 407,785 | 964,298 |
| Total | 19,358,984 | 26,367,334 | 33,328,460 | 43,907,436 | 55,623,107 | 62,361,615 | 50,738,403 | 8,042,157 | 8,054,291 | 8,118,790 |

# 1993-95 Tuna fillets excluded from this category.
Source: Japan Marine Products Importers Association

# Republic of Korea

Along with Japan and Taiwan, the Republic of Korea (ROK) possesses one of Asia's largest distant-water longlining fleets. Like their East Asian competitors, ROK vessels fish all over the globe for these lucrative fish which are largely exported to the Japanese market. ROK distant-water longliners catch a small quantity of swordfish incidentally in this fishery. ROK swordfish catch has historically comprised a smaller percentage of overall tuna and billfish catch than is the case in Japan and Taiwan.

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## I. Fleet

### Distant-water Tuna Vessels

The ROK distant-water tuna fishery began in 1957 with tuna longlining in the Indian Ocean.[1] The longliner fleet expanded rapidly from 30 vessels in 1965 to 200 in 1975. During this time, ROK longliners primarily targeted albacore tuna for the international canned market. Many of the ROK longliners were second-hand Japanese vessels. During the 1970s, there was a shift from albacore longlining to yellowfin/bigeye longlining for the Japanese *sashimi* market.[2] During the past 15 years, the number of ROK longliners reached a peak of 387 vessels in 1989, but has since decreased rapidly to a low of 218 longliners in 1994 (appendix 1).

**Longliners**: The ROK tuna/billfish longliner fleet consists of longliners based at the major fishing port of Pusan on the east coast, and at foreign ports around the world. The domestic-based longliners target bigeye and yellowfin tuna for the Japanese *sashimi* market, while the foreign-based fleet focuses on albacore for canning. Data for 1992 supplied by the U.S. Embassy in Seoul indicate there were 195 domestic-based ROK tuna longliners: 178 in the Pacific Ocean, 4 in the Indian Ocean, and 13 in the Atlantic Ocean. There were 53 ROK foreign-based longliners; 42 in the Pacific Ocean, 5 in the Indian Ocean, and 6 in the Atlantic Ocean.[3]

It has been reported in Japan that there was a major shift in effort by ROK longliners from the Indian and Atlantic Oceans to the Pacific Ocean during 1991.[4] This shift is reflected in the most recent statistics from the Indo-Pacific Tuna Programme and the International Convention for the Conservation of Atlantic Tunas which show the ROK Indian Ocean longliner fleet decreased from 112 vessels in 1988 and 77 vessels in 1990 to just 19 in 1991. ROK Atlantic Ocean longliners decreased from 33 vessels in 1989 and 17 vessels in 1990 to only 8 vessels in 1992.[5] Data for the distant-water tuna longliners operating in the Pacific indicates a growing fleet from 1988-91, but an overall reduction in fleet size during 1992-94 (appendix 2).

The Forum Fisheries Agency has reported that as many as 300 ROK longliners may be active in the Pacific.[6] An ROK industry representative reports that just 116 ROK longliners were active in the Pacific as of April 1994,[7] but it is believed that ROK companies own approximately 80 percent of the estimated 200 flag-of-convenience tuna longliners fishing in the western Pacific, so the figure of 300 ROK longliners may be more accurate.[8]

It has also been reported that fishing for albacore by ROK foreign-based longliners in the south Pacific was poor during the 1990/91 season. Combined with low albacore prices, poor unit-of-effort catch results forced the fleet to target bigeye and yellowfin tuna for the Japanese *sashimi* market. The number of ROK longliners based in Pago Pago, American Samoa (one of the main tuna

canning locations in the Pacific), dropped from 25 longliners in 1989 to just 8 vessels in 1991.[9]

**Longliner Construction:** The Japanese fisheries press reported in 1990 that the ROK tuna industry had received permission to build 36 tuna longliners. Of this total, 26 were to be exported, and 10 were to be added to the domestic fleet. Oversupply on the Japanese *sashimi* market and increased competition from Taiwan longliners resulted in weakened interest for increased investment in new ROK tuna longliners. As a result, only 5 of the 26 longliners for export markets and 2 of the 10 longliners for the domestic market were actually built.[10] The situation in 1993 appeared to be even more bleak with reports of additional ROK distant-water tuna vessels tied up in the port of Pusan, no longer able to compete with rival fleets, particularly the Taiwan fleet.[11]

Construction of new distant-water fishing vessels has been at a standstill in the ROK since 1989 and the ROK Government is expected to suspend its financial support for new vessel construction. Funds originally earmarked for new vessel construction in 1992 (approximately $44 million) were used instead to finance the renovation and upgrading of over 300 coastal and offshore ROK fishing vessels.[12] ROK statistics on the age distribution of distant-water longliners indicate an aging fleet (appendix 3).

**Labor shortages:** As is the case with its Taiwan and Japanese competitors, ROK tuna fleets face an acute shortage of domestic labor. Although Government statistics indicate the number of distant-water fishery workers has fluctuated on a year-to-year basis since 1986 (appendix 4), an overall downward trend similar to Japan has taken hold with the total number of ROK fishery workers falling below the 200,000 level for the first time in 1994. The same downward trend is evident with distant-water fishery workers who have decreased in number from almost 22,000 workers in 1990 to under 13,000 workers in 1994. The primary reason for this decline is the fact that fewer and fewer young Koreans are interested in working in distant-water fishing operations which are perceived to be dirty, dangerous, and difficult.

**Fleet restructuring:** In 1991, the ROK National Fisheries Administration (NFA) announced new policies in anticipation of full ROK fisheries trade liberalization in 1997. Between 1992 and 2001, the NFA plans to reduce the total tonnage of the ROK coastal and inshore fisheries fleet from the 1991 level of 963,000GRT to less than 900,000 gross registered tons. The reduction will focus on small fishing vessels using small-mesh nets that deplete vital fishery stocks. In addition, the NFA announced plans to reduce fishing fleets operating in the Central Bering Sea "Donut Hole" and in the southwestern Atlantic squid fishing ground near the Falkland Islands. The NFA will compensate affected fishermen for lost revenue and will purchase their vessels and gear. The NFA plans to use the purchased vessels as artificial reefs to enhance stocks in coastal waters. The NFA also established the Foreign Fisheries Development Foundation to explore potential new fishing grounds beyond the ROK 200-mile EEZ.[13] (Note to reader: The ROK National Fisheries Administration was integrated into the new Ministry of Maritime Affairs and Fisheries which was established in May 1996.)

ROK Government and industry leaders met in April 1993 to discuss long-term strategies and pro-active measures for the ROK distant-water fishing industry. Industry leaders proposed that the Government reduce interest rates, improve licensing procedures for distant-water fishing vessels, actively work to secure distant-water fishing grounds, and reorganize the structure of the distant-water fishery associations.[14]

**Vessel Exports:** Compared to Japan, the ROK has exported only a small number of fishing vessels. Significant exports of large ROK fishing vessels began only in the late 1980s. Nations most closely associated with flag-of-convenience registry (Panama, Honduras, St. Vincent-Grenadines, Singapore) appear often in these statistics. Japanese fishery industry sources speculate that most flag-of-convenience fishing vessels are aging Japanese-built tuna longliners registered in flag-of-convenience countries by Korean and Taiwan companies. These vessels are believed to focus their operations on catching and freezing tuna for the Japanese *sashimi* market. ROK exports of fishing vessels to the flag-of-convenience nations noted above show that the ROK exported a total of 47 vessels with an average capacity of 519GRT between 1985 and 1995 (appendix 5). It should be noted that only 4 vessels were exported to these countries between 1992 and 1995. It is not clear why ROK exports of fishing vessels to these flag-of-convenience nations have decreased, but the Japanese tuna industry has been urging the ROK and Taiwan tuna industries to discourage flag-of-convenience registry since a glut of *sashimi*-grade tuna supplied by flag-of-convenience longliners has depressed the Japanese *sashimi* market.

In response to these concerns, the ROK Government has initiated a so-called "U-turn" licensing program,

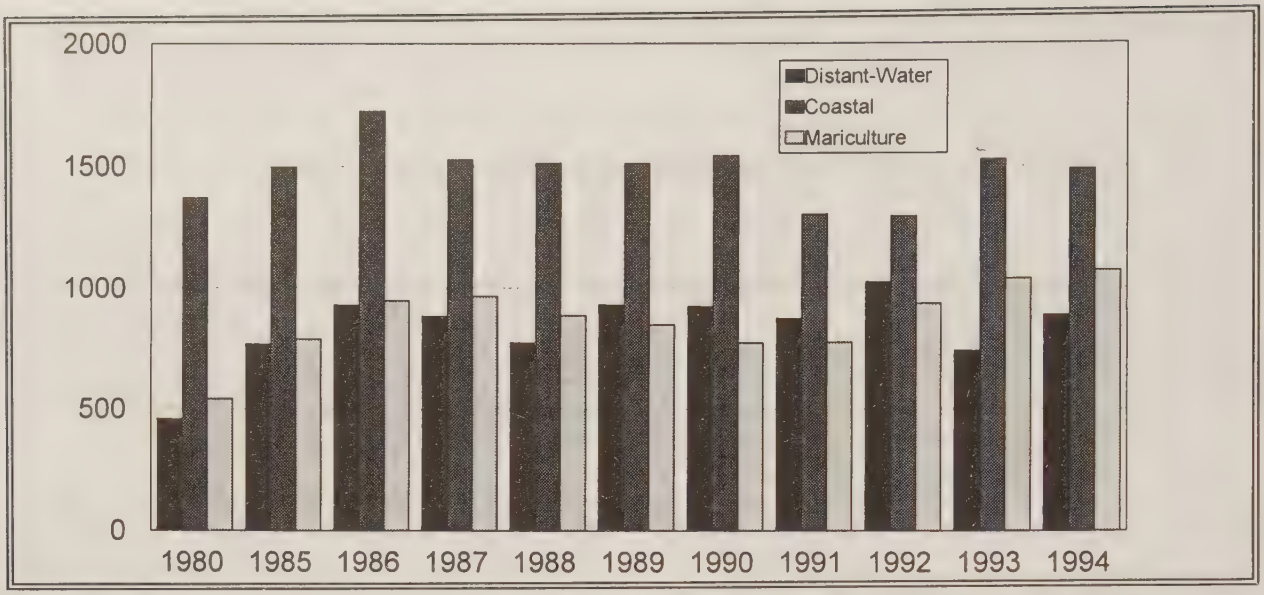


**Figure 1**--ROK marine fisheries catch, by type of fishery, and quantity (metric tons in thousands) 1980, 1985-94. Source: Ministry of Agriculture, Forestry, and Fisheries.

whereby former ROK longliners using flag-of-convenience registry are re-licensed to fly under the ROK flag. At a bilateral meeting in September 1995, the Fisheries Agency of Japan planned to request information on the number of vessels which will be re-licensed and the potential impact on the ROK *sashimi* longliner fleet. Japan also planned to request information on how the ROK would manage these vessels in the future.[15]

## II. Ports

For the distant-water tuna/billfish longliner fleet, there is only one significant port--Pusan, located on the southeast coast of the Korean peninsula. The longliner fleet based in Pusan occupies an increasingly dominant share of the ROK longliner catch; increasing from 67 percent in 1985 to 92 percent in 1993.

## III. Catch

Total ROK fisheries catch during the 1985-94 time period has fluctuated overall, but has increased each year since 1991 (appendix 6, figure 1). Marine fisheries catch has mirrored this trend, reaching 3.5 million t in 1994, the highest level since the all-time record of 3.6 million t in 1986. Distant-water catch has fluctuated during this time frame, ranging from a low of 741,000 t in 1993 to a high of 1.02 million t in 1992. Coastal catches have been more stable, averaging between 1.3 million t and 1.5 million t since 1987.

ROK catch statistics for the tuna longlining fleet are divided into two categories: longliners based in foreign ports, and longliners based in a domestic port (Pusan). Catches in both of these two fisheries have declined steadily, particularly for the foreign based fleet (appendix 7). Catch for the foreign-based fleet in 1994 was, in fact, approximately one-fifth the level it was in 1985. The decrease for the domestically based fleet has been far less dramatic, falling 19 percent over the same time period.

Broken down by ocean, it is even more evident that ROK effort on tuna and tuna-like species (including billfish) has moved away from distant-water fishing grounds in the Atlantic and Indian Oceans, focusing on the nearby Pacific (appendix 8). In both the Atlantic and Indian Oceans, total catches dropped precipitously for all species. Catch levels for billfishes have also dropped, but not as precipitously as for tuna species. In the Pacific Ocean, however, tuna and billfish catch nearly trebled between 1986 and 1992.

ROK billfish catch statistics indicate that swordfish has comprised a smaller percentage of billfish catch than is the case in Japanese and Taiwan fisheries (appendix 9). Swordfish has comprised between 1 and 17 percent of total ROK billfish catch between 1980 and 1994, with total annual swordfish catches ranging from a low of 32 t

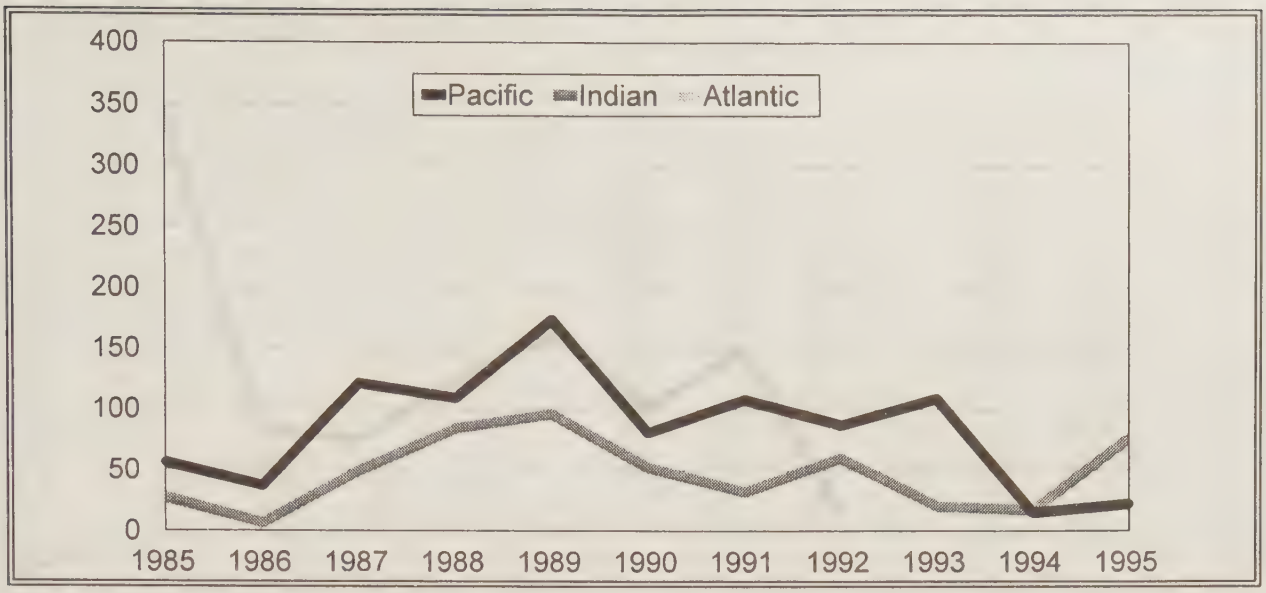


**Figure 2**--ROK swordfish catch by Ocean, and quantity (metric tons), 1985-95. Source: FAO

in 1994 to a high of 1,248 t in 1980. Since 1990, swordfish catch has ranged between 32 and 290 tons.

Catch statistics broken down by FAO area indicate the sporadic nature of ROK swordfish catch (appendix 10). ROK vessels have registered swordfish catch in just two areas in each year since 1985; area 77 (east central Pacific) and area 51 (western Indian Ocean). Landings tended to be greatest in Atlantic Ocean fisheries until 1992. In 1993, the ROK reported no swordfish landings in the Atlantic to the FAO for the first time, with landings in the Pacific and Indian Oceans also at low levels (figure 2).

ROK billfish catches reported to the Indo-Pacific Tuna Development and Management Program (IPTP) are consistent with the FAO data until 1992 (appendices 11 and 12). In 1992, however, the ROK reported a 747 t catch of swordfish in the western Indian Ocean, fully 43 percent of total ROK billfish landings in this area. In 1993, landings increased to 1,157 t, or 51 percent of total landings. Annual landings for the eastern Indian Ocean were at a much lower level, ranging from 0 to 95 t since 1985.

Data presented to ICCAT indicate that although ROK swordfish catches have declined significantly, ROK vessels were still catching swordfish in the Atlantic Ocean through 1994 (appendix 13, figure 3). This data also indicates that swordfish comprised a much larger portion of ROK billfish catch than the data presented to FAO. Data for 1980, 1985-89, and 1993 indicate swordfish comprised between 63 and 83 percent of total billfish landings. Data for 1990-92, however, indicate swordfish comprised just 18-19 percent of total landings. The total amount of ROK Atlantic swordfish landings reported to ICCAT also exceeds the data reported to FAO, ranging from a low of 101 t in 1990 to a high of 1,096 t in 1989.

Data presented in the annual ROK Ministry of Agriculture, Forestry, and Fisheries statistical yearbook, broken down by billfish species, correspond generally to that appearing in the FAO yearbook. These data show that most billfish are caught by home port longliners, with most of this billfish termed "other marlin" as opposed to specific billfish species(appendix 14). Billfish catch by home port longliners increased dramatically from 5,843 t in 1992 to 7,485 t in 1993. In 1994, the catch by this fleet decreased slightly to 6,808 tons. Swordfish catch by home port longliners has fluctuated between 32 t and 260 t since 1990. Billfish catch by the foreign-based longliners has decreased rapidly from 1,124 t in 1990 to just 161 t in 1994. Swordfish catch has decreased from 64 t in 1990 to no catch recorded since 1992.

In the Pacific Ocean, one sees trends that generally reflect those seen in the overall catch (appendix 15). Catch by the home port longliner fleet has increased steadily in the 1990s, rising from nearly 3,000 t in 1990 to nearly 6,000 t in 1993. As with the overall catch, the 1994 catch by the home port longliner fleet decreased to 4,800 tons. Since most of the billfish is classified as "other marlin," it is difficult to discern species-specific trends, but black marlin and sailfish showed the most dramatic increases during this time frame. Sailfish posted a

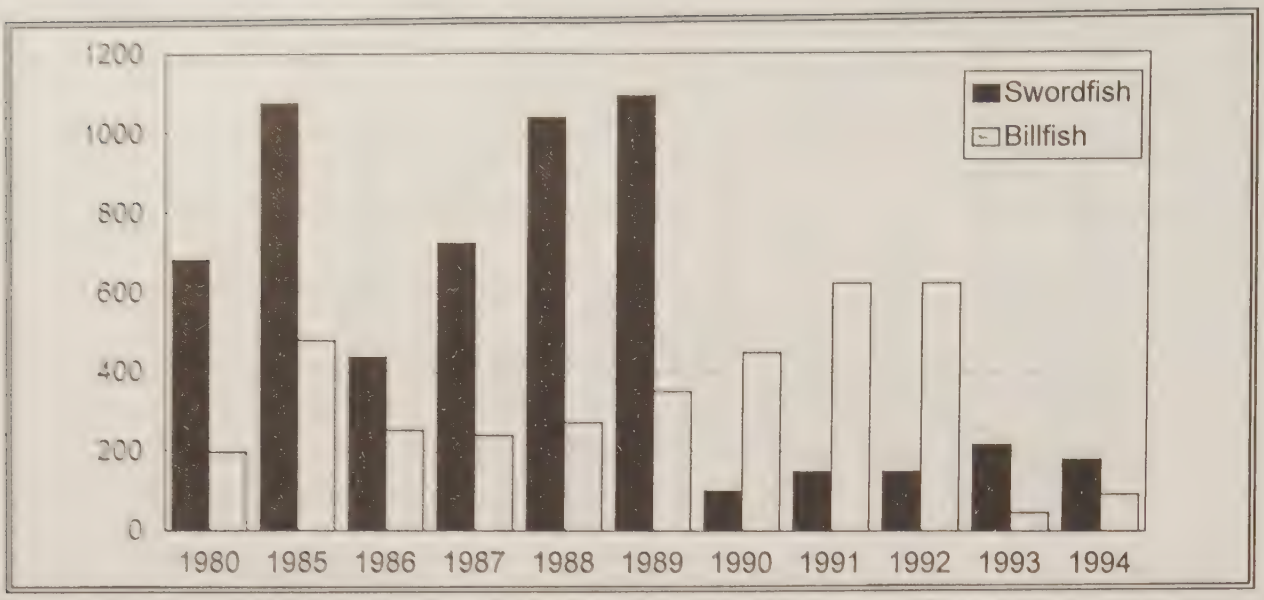


**Figure 3**--ROK catch of billfish by longliners fishing in the Atlantic and Mediterranean Oceans, by quantity (metric tons),1980, 1985-94. Source: ICCAT

dramatic increase in 1994, increasing to 1,200 t from the 1993 catch of just under 600 tons.

In the Atlantic Ocean, a low level of billfish catch is reported (appendix 16). Most of the billfish is classified as "other marlin" with the remainder comprised of swordfish. Catch in the Atlantic dropped off sharply in 1992, with no catch reported in 1993. In 1994, the only catch reported was by the home port tuna longliner fleet, which reported a 92 t catch of "other marlin."

Billfish catch has fluctuated in the Indian Ocean since 1990 (appendix 17). Catch by the foreign-base longliner fleet has decreased from 450 t in 1990 to 117 t in 1994, while catch by the home port fleet has ranged between 500 t and 1,900 tons. As with appendices 14-16, catch is largely classified as "other marlin," with low levels of reported swordfish catch

## IV. Transshipments

ROK distant-water fishing vessels operate from a number of foreign bases which are located near major tuna/billfish fishing grounds. In the Atlantic Ocean, ROK vessels operate from Mauritania, Senegal, Guinea-Bisseau, Guinea, Sierra Leone, Uruguay, Suriname, Argentina, and the Falkland Islands. In the Indian Ocean, ROK vessels operate from Saudi Arabia, Pakistan, Oman, and Indonesia. In the Pacific Ocean, ROK vessels operate from Papua New Guinea, Kiribati, Tuvalu, French Polynesia, Cook Islands, Mexico, Peru, New Zealand, Russia, and Indonesia. Although detailed landings data is not available, ROK longliners may be landing and transshipping tuna and billfish at many of these ports.[16]

## V. Companies

A list of 22 ROK tuna longliner companies is provided in appendix 18. There is no ROK tuna longliner fishing association, but the ROK Deep-Sea Fisheries Association represents ROK companies involved in distant-water operations.

## VI. Domestic Consumption

Although little information is available on swordfish consumption in the ROK, it would appear that it is on the increase thanks to the dramatic growth of the ROK *sashimi* industry. As the Japanese *sashimi* market has become increasingly competitive in the 1990s, the ROK tuna industry has sought to foster a domestic *sashimi* market which could absorb some of this lucrative product. It appears that these efforts are beginning to bear fruit.

Reports in the Japanese fisheries press show that the amount of *sashimi*-grade tuna and the number of ROK

establishments which sell this tuna have increased greatly during the 1990s. The ROK consumed just 3,000 t of tuna in 1990, but by the end of 1994 this figure had increased to 8,600 tons. In 1995, the ROK Government reports that 10,625 t of tuna were consumed. The number of ROK supermarkets and department stores which sell *sashimi*-grade tuna have increased from just 10 in 1990 to approximately 350 in 1995. The number of *sashimi* restaurants has increased from 0 in 1990 to 346 in 1995, and the number of stores which provide residential *sashimi* delivery services has gone from 0 in 1991 to 36 in 1995.[17]

## VII. Exports

An analysis of ROK swordfish exports to major importers (the EU, Japan, and the United States) reveals the following: ROK exports to the EU have been limited to frozen swordfish, and have ranged from no exports in 1993 to 452 t valued at $1.9 million in 1991 (Overview chapter, appendix 14). Although the ROK exported 95 t of frozen swordfish to the EU in 1994, it seems that ROK exports to this market are inexorably declining.

Exports to the United States have been at a low level since 1991 (Overview chapter, appendix 18). The ROK exported just 1 t of frozen swordfish valued at $2,000 in 1991, but exported no swordfish to the United States between 1992 and 1994. In 1995, the ROK exported 2 t of frozen swordfish valued at $5,000 to the United States.

Japanese trade statistics indicate significant imports of ROK fresh and frozen billfish (including swordfish) fillet product between 1985 and 1994 (Japan chapter appendices 37-42). ROK exports of frozen billfish (including swordfish) to Japan have ranged from a high of 6,900 t in 1987 to a low of 2,700 t in 1995. In the 1990s, exports have ranged between 2,700 and 4,300 t, with a generally decreasing trend. This decrease can largely be attributed to reduced ROK catches and the depressed Japanese economy. ROK exports of frozen tuna and billfish (including swordfish) fillets ranged between 500 and 2,300 t from 1986 to 1992. Since frozen tuna fillets were excluded from this category in 1993, exports to Japan of frozen billfish fillets have ranged between 200 and 300 tons.

## VIII. Imports

The ROK does not keep statistical data on billfish imports, including swordfish.

## IX. Legal Framework

Under ROK Fisheries Law 43, distant-water fishing vessels are licensed for a five-year period. There is no license fee. The conditions of the license are as follows: 1) ROK vessels are not permitted to catch fish within the coastal waters of a foreign country without the permission of that country's authorities, 2) ROK vessels must comply with the restrictions specified under international fishery management organizations as well as the fishery regulations of related coastal countries, 3) ROK vessels should report the fishing conditions, periods of fishing, and the foreign country where fishing took place, to the ROK National Fisheries Administration, and 4) ROK vessels should comply with restrictions and conditions specified in access agreements with foreign governments.

## X. Research

Research on tuna and billfish species in the Republic of Korea is conducted primarily by scientists affiliated with the National Fisheries Research and Development Agency (NFRDA), an organization which functions within the National Fisheries Administration. Under the NFRDA, there are two departments; Oceanography and Marine Resources, and Aquaculture. Within the Oceanography and Marine Resources Department, there is a division devoted to Deep-sea resources. This division is responsible for research in the following areas: the biology and population dynamics of certain pelagic and demersal species, the distribution and abundance of deep-sea fishery stocks based on biological and oceanographic data collected by research vessels and ROK distant-water fishing vessels.[18]

## XI. Foreign Interests

With the termination of access to the waters of many countries, including the United States and Canada, and increasing restrictions on distant-water highseas fisheries, ROK tuna fishermen have focused their attention on the

value-added fisheries processing sector and gained access to foreign fisheries through joint ventures, primarily with developing coastal countries. ROK tuna vessels have secured access to 200-mile zones in Peru, Kiribati, the French Pacific Island territories, Papua New Guinea, the Philippines, Mexico, Colombia, Sierra Leone, Senegal, Angola, Guinea-Bissau, and Saudi Arabia.

Gaining access to foreign fisheries has become increasingly expensive. The ROK National Fisheries Administration reports that the ROK paid a total of nearly $94 million in foreign fishery access fees during 1991, a 290 percent increase over such fees paid in 1990. The highest fees were paid to the former Soviet Union ($52.8 million), the United Kingdom ($8.6 million), Papua New Guinea ($7.2 million), and Kiribati ($5.5 million).[19] Information regarding ROK distant-water fleet activity and joint ventures in foreign countries is as follows:

**South Southeast Asia**

**India**: The ROK tuna fishing company, Tae Eun, has formed a joint venture in India with Fishing Falcons Ltd. of Hyderabad. Equity capital is shared by the Indian promoter, Mr. Sridhar Reddy, Tae Eun Company, the Indian Marine Products Export Development Authority, and the public. The joint venture company operates two ROK-built longliners, the *Vaishnavi I* and the *Vaishnavi II*. Exploratory fishing was conducted in December 1992 with a reported daily catch of 2 to 2.5 t of bigeye and yellowfin tuna per vessel.[20]

**Indonesia**: ROK fishing vessels have access to Indonesian waters through joint ventures and leasing arrangements with Indonesian companies. A small number of tuna longliners are also licensed to fish in Indonesian waters. In 1988, just 1 ROK longliner was licensed, and this number increased to 6 in 1990. All the ROK longliners were in the 100-200-GRT range.[21]

**Oceania**

**Cook Islands/Tuvalu**: Agreements with these two South Pacific nations allowed ROK tuna vessels access only until the end of the 1991-92 fishing season.[22] Currently available information indicates no ROK vessels are fishing in this area.

**French Pacific Territories:** The ROK-France agreement allowed 125 ROK tuna longliners to catch 6,100 t of tuna in French Polynesian waters during 1992 for a fee of $835,440.[23] In 1994, 74 ROK vessels were granted a 3,800 t catch quota for a fee of $1.7 million.[24] The number of ROK longliners allowed access decreased considerably in 1995 when France permitted just 46 ROK longliners to fish in the waters of French Polynesia for a fee of $28,380 per vessel (for a total of $1.3 million). Japanese industry observers feel that the ROK vessels are fishing for bigeye tuna in the Tuamotus archipelago located closest to the west longitude fishing grounds. This is the same area fished by Japanese longliners until its access agreement expired in 1992.[25]

**Kiribati:** In 1990, The Korean Deep Sea Fisheries Association agreed to pay a $960,000 access fee which would allow 113 ROK longliners to fish in Kiribati waters. ROK companies were required to hire Kiribati crew under this agreement.[26] The agreement was renewed in July 1992, allowing 110 ROK longliners access for a fee of $1.4 million.[27] The most recent renewal of this agreement allows 178 ROK longliners to fish in Kiribati waters for a fee of $18,600 per vessel (for a total of $3.3 million) from May 1995 to May 1996.[28]

**Papua New Guinea (PNG)**: The ROK-PNG agreement allows ROK tuna vessels access to PNG fishing grounds, calls for the promotion of joint fishery ventures, and provides for the exchange of fisheries experts. In 1991, 35 ROK tuna vessels (probably purse seiners) caught approximately 75,000 t of tuna in PNG waters. During the most recent round of negotiations held in October 1992, the ROK and PNG were unable to reach agreement because the PNG wanted to reduce the number of ROK vessels by 20 percent over the next three years and raise the access fee by 12.2 percent.[29] No information is available which indicates ROK longliners are fishing in PNG waters.

**Africa/Middle East**

**Las Palmas (Spain)**: The Japanese tuna industry press reported in August 1994 that four Chinese longliners, equipped with super-low temperature freezers, were operating out of Las Palmas in the Atlantic Ocean. The vessels were described as being old and decrepit. Although flying the Chinese flag, the word "Panama" was clearly visible above the Chinese character vessel names. The Japanese speculate that a Korean company may be providing technical guidance and may have been involved with the reflagging of the vessels.[30]

**Seychelles:** ROK tuna longliners have access to Seychelles waters under an individual licensing agreement.[31] In 1990, a total of 88 ROK longliners were licensed,[32] a significant decline from the 1988 figure of

127 ROK longliners.[33] The most recent data shows that 54 licenses were granted to ROK longliners in 1993, but this figure increased greatly in 1994 to 115 licenses.[34]

**Yemen:** ROK companies reportedly had agreements with Yemen to fish in the Yemeni EEZ, but these agreements have expired because the ROK companies refused to form joint venture companies.[35]

**Latin America**

**Brazil:** The most recent report to ICCAT by Brazil indicates 2 Korean longliners leased to Brazilian companies operated out of the port base of Rio G. Do Sul in 1994. No Korean longliners were licensed to fish in Brazilian water during 1992 or 1993. Catches for the foreign-leased longliner fleet in Brazil (individual country breakdown unavailable) indicate that swordfish comprised between 15 and 30 percent of the overall catch between 1992-94.[36]

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23. U.S. Embassy, Port Moresby, January 30, 1992; *Nikkan Suisan Keizai Shimbun*, February 3, 1992.

24. Yonhap, July 8, 1994.

25. *Katsuo-Maguro Tsushin*, No. 7305, March 8, 1995, as reported in *Forum Fisheries News Digest*, No. 4, September/October 1995.

26. *Pacific Magazine*, 5-6/90, as reported in *Forum Fisheries Agency News Digest*, No.4, April/May 1990, p. 4.

27. *Nikkan Suisan Keizai Shimbun*, July 21, 1992.

28. Details of this agreement were obtained from the Korea Deep Sea Fisheries Association.

29. *Agriculture, Fisheries, and Livestock*, November, 6, 1992, as printed in *Pacific Rim Fisheries Update*, February 1993.

30. *Katsuo-Maguro Tsushin*, No. 7072, August 11, 1994, as reported in *Forum Fisheries Agency News Digest*, No. 5/94, September-October 1994.

31. *Katsuo-Maguro Tsushin*, No. 6531, May 14, 1992, as reported in *Forum Fisheries Agency News Digest*, No.4, July-August 1992, p. 3.

32. *Tuna Bulletin-Second Quarter 1991*, Seychelles Fishing Authority, undated.

33. "The Fisheries of Seychelles," by Elaine Yanotti, NOAA National Marine Fisheries Service, *International Fishery Reports*, IFR 89/96, December 8, 1989.

34. "Tuna Industry in the Western Indian Ocean," Joel Nageon de Lestang, in *Tuna 95 Manila*, p. 85.

35. U.S. Embassy, Sanaa, June 30, 1993.

36. "National Report of Brazil," by J.H. Meneses de Lima, IBAMA, ICCAT National Report SCRS/95/125, 1995.

Appendix 1. Republic of Korea. Distant-water tuna/billfish fishing vessels, by number and gross registered tonnage; 1985-94.

| Vessel Type | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT |
| *Number of Vessels/Tonnage (thousands)* | | | | | | | | | | | | | | | | | | | | |
| Longliners | 280 | 99 | 295 | 106 | 338 | 126 | 373 | 139 | 387 | 146 | 285 | 107 | 285 | 107 | 279 | 103 | 237 | 91 | 218 | 85 |
| Purse Seine | na | na | na | na | na | na | na | na | na | na | na | na | 32 | 34 | 31 | 33 | 30 | 31 | 31 | 33 |
| Total | 280 | 99 | 295 | 106 | 338 | 126 | 373 | 139 | 387 | 146 | 285 | 107 | 317 | 141 | 310 | 136 | 267 | 122 | 249 | 118 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, ROK Ministry of Agriculture, Forestry, and Fisheries, 1986-95.

Appendix 2. Republic of Korea. Distant-water tuna longliners fishing fleet: by fishing grounds and gross registered tonnage: 1980-94.

| Year | Atlantic Ocean* | | | Indian Ocean | Pacific Ocean |
|---|---|---|---|---|---|
| | 50-200GRT | 200-500GRT | Over 500GRT | Number of Vessels | Number of Vessels |
| 1980 | 2 | 52 | -- | 173 | 211 |
| 1981 | 2 | 56 | -- | 142 | 209 |
| 1982 | 1 | 52 | -- | 146 | 121 |
| 1983 | -- | 53 | -- | 115 | 102 |
| 1984 | -- | 51 | -- | 75 | 96 |
| 1985 | -- | 45 | -- | 62 | 94 |
| 1986 | -- | 28 | -- | 66 | 134 |
| 1987 | -- | 29 | -- | 81 | 138 |
| 1988 | -- | 29 | -- | 112 | 124 |
| 1989 | -- | 33 | -- | 87 | 152 |
| 1990 | -- | 17 | -- | 77 | 182 |
| 1991 | -- | 9 | -- | 19 | 220 |
| 1992 | -- | 8 | -- | 40 | 166 |
| 1993 | na | na | na | 47 | 148 |
| 1994 | na | na | na | na | 160 |

*-- Some Panamanian flag vessels, chartered by Korean enterprises, are included in ICCAT data.

Sources: Atlantic-ICCAT Statistical Bulletin. 1992: Indian-Indo-Pacific Tuna Development and Management Programme Data Summary No. 14, 1995. Pacific--Report of the Fourth Meeting of the Western Pacific Yellowfin Tuna Research Group. *Tuna Fishery Yearbook 1994*, South Pacific Commission.

Appendix 3. Republic of Korea. Number of distant-water tuna/billfish fishing vessels, by type of vessel and age; 1985-94.

| Vessel Type | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Number of fishing vessels* | | | | | | | | | | |
| **Longliners** | | | | | | | | | | |
| 0-5 Years | 23 | 21 | 54 | 81 | 92 | 98 | 94 | 83 | 57 | 43 |
| 6-10 Years | 34 | 40 | 45 | 44 | 28 | 17 | 10 | 22 | 50 | 78 |
| 11-15 Years | 83 | 98 | 103 | 108 | 105 | 44 | 48 | 42 | 34 | 28 |
| 16-20 Years | 68 | 55 | 46 | 30 | 53 | 71 | 78 | 76 | 68 | 46 |
| Over 20 years | 72 | 81 | 90 | 110 | 109 | 55 | 55 | 56 | 28 | 23 |
| **Purse Seiners** | | | | | | | | | | |
| 0-5 Years | na | na | na | na | na | na | 3 | 3 | 3 | 3 |
| 6-10 Years | na | na | na | na | na | na | 12 | 6 | -- | -- |
| 11-15 Years | na | na | na | na | na | na | 6 | 10 | 15 | 15 |
| 16-20 Years | na | na | na | na | na | na | 11 | 11 | 8 | 7 |
| Over 20 Years | na | na | na | na | na | na | - | 1 | 4 | 6 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1986-1995.

Appendix 4. Republic of Korea. Fishery labor force, by age; 1980, 1985-95.

| Fishery Workers | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *Number of workers* | | | | | | |
| **Fishery Workers** | 323,166 | 260,326 | 259,747 | 255,162 | 248,635 | 238,534 | 211,753 | 204,596 | 206,624 | 206,569 | 197,782 |
| **Members per household** | 2.06 | 1.79 | 1.81 | 1.81 | 1.8 | 1.78 | 1.74 | 1.71 | 1.78 | 1.82 | 1.79 |
| **Crew in distantwater fisheries** | 15,550 | 13,789 | 16,178 | 19,102 | 19,987 | 20,924 | 21,709 | 20,509 | 14,212 | 14,090 | 12,537 |
| **Fishery workers, by age** | | | | | | | | | | | |
| 14-19 | na | 3,984 | 3,648 | 3,203 | 2,808 | 1,946 | 1,499 | 1,428 | 892 | 655 | 356 |
| 20-29 | na | 38,152 | 35,680 | 34,765 | 30,451 | 24,401 | 21,134 | 16,908 | 14,481 | 12,644 | 9,956 |
| 30-39 | na | 52,051 | 51,856 | 56,143 | 54,569 | 51,550 | 47,019 | 44,757 | 42,109 | 41,347 | 37,260 |
| 40-49 | na | 68,693 | 67,628 | 72,460 | 69,579 | 67,606 | 57,841 | 54,079 | 52,518 | 51,836 | 49,827 |
| 50-59 | na | 50,428 | 53,445 | 60,991 | 63,005 | 63,352 | 57,018 | 58,186 | 60,928 | 60,922 | 58,804 |
| Over 60 | na | 23,329 | 24,699 | 27,600 | 28,223 | 29,679 | 27,242 | 29,238 | 35,696 | 39,165 | 41,579 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1981, 1986-1995.

Appendix 5. Republic of Korea. Exports of fishing vessels to China and flag-of-convenience nations, 1985-95.

| Year | | Panama | Honduras | St. Vincent | Singapore |
|---|---|---|---|---|---|
| | | *Number of vessels/Gross registered tonnage* | | | |
| 1985 | No | - | - | - | - |
| | GRT | - | - | - | - |
| 1986 | No | - | 1 | - | - |
| | GRT | - | 311 | - | - |
| 1987 | No | 1 | 1 | - | - |
| | GRT | 1,652 | 377 | - | - |
| 1988 | No | 2 | 2 | - | - |
| | GRT | 5,624 | 832 | - | - |
| 1989 | No | 5 | 5 | - | 3 |
| | GRT | 2,679 | 2,058 | - | 306 |
| 1990 | No | 6 | 3 | 9 | 1 |
| | GRT | 2,416 | 1,494 | 2,436 | 305 |
| 1991 | No | - | 2 | 2 | - |
| | GRT | - | 832 | 168 | - |
| 1992 | No | - | - | - | - |
| | GRT | - | - | - | - |
| 1993 | No | - | - | - | 1 |
| | GRT | - | - | - | 401 |
| 1994 | No | - | - | - | 1 |
| | GRT | - | - | - | 800 |
| 1995 | No | 1 | - | - | 1 |
| | GRT | 886 | - | - | 800 |
| Total | No | 15 | 14 | 11 | 7 |
| | GRT | 13,257 | 5,904 | 2,604 | 2,612 |
| | Avg. GRT | 884 | 422 | 237 | 373 |

Source: *Statistical Yearbook of Foreign Trade*, Korean Customs Administration, Korea Customs Research Institute.

Appendix 6. Republic of Korea. Fisheries catch, by type of fishery; 1980, 1985-94.

| Type of Fishery | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Metric tons* | | | | | |
| **Marine Fisheries** | | | | | | | | | | | |
| Distant-water | 458,209 | 767,030 | 929,886 | 882,660 | 774,240 | 930,333 | 925,331 | 873,465 | 1,023,926 | 741,017 | 887,198 |
| Coastal | 1,370,324 | 1,494,514 | 1,725,820 | 1,525,999 | 1,512,481 | 1,510,262 | 1,542,013 | 1,303,913 | 1,295,396 | 1,526,139 | 1,486,357 |
| Whaling | 2,023 | 426 | - | - | - | - | - | - | - | -- | -- |
| Mariculture | 540,564 | 787,571 | 946,965 | 966,063 | 886,605 | 848,246 | 772,731 | 775,419 | 935,478 | 1,038,119 | 1,072,126 |
| Total Marine | 2,371,120 | 3,049,541 | 3,602,671 | 3,274,722 | 3,173,326 | 3,288,841 | 3,240,075 | 2,952,797 | 3,254,800 | 3,305,275 | 3,445,681 |
| **Freshwater Fisheries** | | | | | | | | | | | |
| Wild catch | 38,232 | 50,400 | 51,779 | 47,598 | 24,681 | 18,958 | 18,594 | 16,167 | 14,192 | 11,877 | 10,041 |
| Freshwater culture | 994 | 2,664 | 5,274 | 9,505 | 11,128 | 11,596 | 15,837 | 14,258 | 20,049 | 18,379 | 20,865 |
| Total Freshwater | 39,226 | 53,064 | 57,053 | 57,103 | 35,809 | 30,554 | 34,431 | 30,425 | 34,241 | 30,256 | 30,906 |
| **Grand Total** | 2,410,346 | 3,102,605 | 3,569,724 | 3,331,825 | 3,209,135 | 3,319,395 | 3,274,506 | 2,983,222 | 3,289,041 | 3,335,531 | 3,476,587 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1986-1995.

Appendix 7. Republic of Korea. Tuna/billfish fisheries catch, by type of vessel, species, and fishing area, 1985-94.

| Vessel Type | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *Metric tons* | | | | | |
| Longliner-Foreign Base | 30,034 | 30,071 | 18,411 | 17,311 | 15,851 | 16,011 | 7,060 | 5,072 | 3,954 | 6,102 |
| Longliner-Home Port | 63,056 | 65,330 | 69,026 | 64,415 | 48,362 | 53,513 | 40,014 | 47,707 | 48,244 | 50,947 |
| Total Longlining | 93,090 | 95,401 | 87,437 | 81,726 | 64,213 | 69,524 | 47,074 | 52,779 | 52,198 | 57,049 |
| | | | | | | | | | | |
| Skipjack Jigging | 260 | 268 | - | - | - | - | - | - | -- | -- |
| Purse Seine | 11,279 | 27,732 | 58,752 | 79,397 | 115,754 | 173,343 | 227,518 | 182,287 | 126,648 | 195,014 |
| Albacore Driftnet | - | - | - | 342 | 950 | 384 | 295 | - | -- | -- |
| Coastal Tuna (all gear types) | 2,712 | 628 | 469 | 1,607 | 1,171 | 1,138 | 1,862 | 1,490 | 459 | 848 |
| Total | 1e+05 | 1e+05 | 1e+05 | 2e+05 | 2e+05 | 2e+05 | 3e+05 | 231,484 | 179,305 | 252,911 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1986-1995.

Appendix 8. Republic of Korea. Catch quantity of tuna and tuna-like species by ocean, year, and species.

| Area Species | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
| | *Metric tons* | | | | | | |
| **Atlantic Ocean** | | | | | | | |
| Bluefin Tuna | -- | -- | -- | -- | -- | -- | -- |
| Yellowfin Tuna | 1,818 | 1,457 | 2,173 | 2,535 | 808 | 260 | 219 |
| Albacore | 694 | 401 | 197 | 107 | 85 | 32 | -- |
| Bigeye Tuna | 6,084 | 4,438 | 4,919 | 7,896 | 2,690 | 801 | 866 |
| Skipjack | 6 | 71 | 6 | -- | -- | -- | -- |
| Billfishes | 265 | 275 | 532 | 1,019 | 547 | 774 | 57 |
| Other | 1,140 | 1,102 | 841 | 974 | 297 | 275 | 10 |
| Subtotal | 10,012 | 7,679 | 8,733 | 12,537 | 4,427 | 2,142 | 1,152 |
| **Indian Ocean** | | | | | | | |
| Bluefin Tuna | -- | -- | -- | -- | -- | -- | 15 |
| Yellowfin Tuna | 14,891 | 12,575 | 13,428 | 8,103 | 7,006 | 3,004 | 4,085 |
| Albacore | 171 | 221 | 115 | 55 | -- | -- | 5 |
| Bigeye Tuna | 11,397 | 13,862 | 16,509 | 11,698 | 10,313 | 2,124 | 4,536 |
| Skipjack | -- | -- | 12 | 1 | -- | -- | 1 |
| Billfishes | 2,813 | 2,729 | 2,649 | 2,328 | 1,874 | 693 | 1,137 |
| Other | 1,367 | 1,517 | 1,756 | 1,425 | 1,142 | 360 | 534 |
| **Subtotal** | **30,639** | **30,904** | **34,469** | **23,610** | **20,335** | **6,181** | **10,313** |
| **Pacific Ocean** | | | | | | | |
| Bluefin Tuna | -- | 43 | 6 | -- | 83 | 94 | 87 |
| Yellowfin Tuna | 13,207 | 29,207 | 25,982 | 42,816 | 48,656 | 66,080 | 79,512 |
| Albacore | 18,662 | 8,646 | 7,001 | 4,996 | 3,232 | 1,531 | 217 |
| Bigeye Tuna | 15,927 | 19,544 | 13,681 | 11,342 | 20,931 | 20,345 | 19,800 |
| Skipjack | 25,576 | 40,958 | 63,993 | 80,942 | 138,470 | 171,964 | 115,294 |
| Billfishes | 3,285 | 4,307 | 3,682 | 2,261 | 3,352 | 3,433 | 4,783 |
| Other | 6,093 | 4,141 | 3,576 | 1,993 | 3,381 | 2,822 | 2,879 |
| Subtotal | 82,750 | 106,846 | 117,921 | 144,350 | 218,105 | 266,269 | 222,572 |
| **All Oceans** | | | | | | | |
| Bluefin Tuna | -- | 43 | 6 | -- | 83 | 94 | 102 |
| Yellowfin Tuna | 29,916 | 43,239 | 41,583 | 53,454 | 56,470 | 69,344 | 83,816 |
| Albacore | 19,527 | 9,268 | 7,313 | 5,158 | 3,317 | 1,563 | 222 |
| Bigeye Tuna | 33,408 | 37,844 | 35,109 | 30,936 | 33,934 | 23,270 | 25,202 |
| Skipjack | 25,587 | 40,964 | 64,076 | 80,949 | 138,470 | 171,964 | 115,295 |
| Billfishes | 6,363 | 7,311 | 6,863 | 5,608 | 5,773 | 4,900 | 5,977 |
| Other | 8,600 | 6,760 | 6,173 | 4,392 | 4,820 | 3,457 | 3,423 |
| **Grand Total** | 123,401 | 145,429 | 161,123 | 180,497 | 242,867 | 274,592 | 234,037 |

Source: "Fishery Statistics and Fishing Grounds for the Korean Tuna Longline Fishery, 1988-92," National Fisheries Research and Development Agency, December 1993.

Appendix 9. Republic of Korea. Billfish catch , by species and quantity, 1980, 1985-94.

| Year | Striped Marlin | Swordfish | Blue Marlin | Black Marlin | Sailfish | Other Billfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|---|
| | | | | *Metric tons* | | | | |
| 1980 | 359 | 1,248 | 1,549 | -- | 1,316 | 2,972 | 7,444 | 17% |
| 1985 | 58 | 427 | 324 | 39 | 683 | 4,411 | 5,942 | 7% |
| 1986 | 129 | 125 | 226 | 75 | 656 | 5,152 | 6,363 | 2% |
| 1987 | 140 | 245 | 228 | 122 | 118 | 6,458 | 7,311 | 3% |
| 1988 | 130 | 316 | 534 | 65 | 2 | 5,823 | 6,870 | 5% |
| 1989 | 101 | 432 | 100 | 46 | 15 | 4,918 | 5,612 | 8% |
| 1990 | 14 | 234 | 88 | 86 | 5 | 5,346 | 5,773 | 4% |
| 1991 | 39 | 290 | 176 | 81 | -- | 4,330 | 4,916 | 6% |
| 1992 | 64 | 164 | 142 | 617 | 409 | 4,581 | 5,977 | 3% |
| 1993 | 665 | 129 | 84 | 1,375 | 589 | 4,795 | 7,637 | 2% |
| 1994 | 592 | 32 | 8 | 483 | 1,200 | 4,664 | 6,979 | .5% |

Source: United Nations Food and Agriculture Organization, *Fishery Statistics--Catches and Landings.*

Appendix 10. Republic of Korea. Swordfish catch, by major FAO fishing area, 1980, 1985-95.

| FAO Area | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| | *Metric tons* | | | | | | | | | | | |
| Pacific Ocean | | | | | | | | | | | | |
| Area 71 | 66 | 1 | 14 | 39 | 48 | 120 | 45 | — | 9 | 27 | -- | 9 |
| Area 61 | -- | -- | -- | -- | - | 1 | — | -- | -- | -- | -- | -- |
| Area 77 | 23 | 54 | 23 | 81 | 59 | 51 | 36 | 105 | 78 | 82 | 15 | 13 |
| Area 81 | 198 | 1 | - | 1 | -- | 2 | - | - | - | -- | -- | -- |
| Area 67 | - | - | -- | -- | 2 | - | - | - | - | -- | - | -- |
| Area 87 | 42 | -- | -- | -- | -- | - | - | 3 | - | -- | - | -- |
| Total Pacific | 329 | 56 | 37 | 121 | 109 | 174 | 81 | 108 | 87 | 109 | 15 | 22 |
| Indian Ocean | | | | | | | | | | | | |
| Area 51 | 98 | 27 | 3 | 34 | 35 | 34 | 26 | 17 | 60 | 20 | 17 | 74 |
| Area 57 | 138 | -- | 3 | 15 | 49 | 62 | 26 | 15 | - | -- | -- | 2 |
| Total Indian | 236 | 27 | 6 | 49 | 84 | 96 | 52 | 32 | 60 | 20 | 17 | 76 |
| Atlantic Ocean | | | | | | | | | | | | |
| Area 21 | -- | -- | -- | - | -- | -- | - | -- | - | -- | -- | -- |
| Area 27 | -- | -- | - | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Area 31 | --- | 84 | 21 | 19 | 45 | 54 | 23 | | - | - | -- | -- |
| Area 34 | 664 | 119 | 10 | -- | 72 | 84 | 78 | 150 | 17 | -- | -- | - |
| Area 37 | -- | -- | -- | -- | -- | -- | - | -- | -- | - | - | -- |
| Area 41 | 19 | 134 | 51 | 56 | 6 | 24 | - | -- | -- | -- | - | -- |
| Area 47 | -- | 7 | -- | -- | -- | | - | — | - | - | - | -- |
| Total Atlantic | 683 | 344 | 82 | 75 | 123 | 162 | 101 | 150 | 17 | - | -- | - |
| Grand Total | 1,248 | 427 | 125 | 245 | 316 | 432 | 234 | 290 | 164 | 129 | 32 | 98 |

Source: United Nations Food and Agriculture Organization.

Appendix 11. ROK. Catch of billfish by longliners fishing in the western Indian Ocean (FAO area 51), by species and quantity, 1980, 1985-93.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Other Billfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|---|
| | | | | *Metric tons* | | | | |
| 1980 | 559 | -- | 59 | 103 | 151 | 1,298 | 2,170 | 7% |
| 1985 | 66 | 45 | 11 | -- | 42 | 2,615 | 2,779 | 2% |
| 1986 | 3 | -- | 80 | -- | 5 | 3,696 | 3,784 | 0% |
| 1987 | 2 | -- | 86 | -- | 52 | 3,309 | 3,449 | 2% |
| 1988 | 12 | -- | 59 | -- | 54 | 3,182 | 3,307 | 2% |
| 1989 | -- | -- | 63 | -- | 52 | 2,673 | 2,788 | 2% |
| 1990 | -- | -- | 3 | -- | 40 | 2,384 | 2,427 | 2% |
| 1991 | 17 | -- | 14 | -- | 11 | 964 | 1,006 | 1% |
| 1992 | 409 | 119 | 391 | 58 | 747 | -- | 1,724 | 43% |
| 1993 | 476 | 162 | 426 | 53 | 1,157 | -- | 2,274 | 51% |

Source: Indo-Pacific Tuna Development and Management Programme, *Indian Ocean and Southeast Asian Tuna Fisheries Data Summary for 1993.*

Appendix 12. ROK. Catch of billfish by longliners fishing in the eastern Indian Ocean (FAO area 57), by species and quantity, 1980, 1985-93.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Other Billfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|---|
| | | | | *Metric tons* | | | | |
| 1980 | 544 | -- | 334 | 137 | 213 | 1,089 | 2,317 | 9% |
| 1985 | 29 | 15 | 15 | -- | -- | 517 | 576 | 0% |
| 1986 | 22 | -- | 88 | -- | 5 | 428 | 543 | 1% |
| 1987 | -- | -- | 80 | -- | 23 | 650 | 753 | 3% |
| 1988 | 12 | -- | 68 | -- | 66 | 627 | 773 | 9% |
| 1989 | 20 | -- | 18 | -- | 95 | 662 | 795 | 12% |
| 1990 | 3 | -- | 14 | -- | 40 | 402 | 459 | 9% |
| 1991 | -- | -- | -- | -- | -- | 46 | 46 | 0% |
| 1992 | 6 | 1 | 4 | -- | 7 | -- | 18 | 39% |
| 1993 | 25 | 9 | 33 | 2 | 62 | -- | 131 | 47% |

Source: Indo-Pacific Tuna Development and Management Programme, *Indian Ocean and Southeast Asian Tuna Fisheries Data Summary for 1993.*

Appendix 13. Republic of Korea. Catch of billfish by longliners fishing in the Atlantic and Mediterranean Oceans, by species and quantity, 1980, 1985-94.

| Year | Swordfish | Billfish | Total | Swordfish as % of Total |
|---|---|---|---|---|
| | | *Metric tons* | | |
| 1980 | 683 | 197 | 880 | 78% |
| 1985 | 1,077 | 479 | 1,556 | 69% |
| 1986 | 437 | 252 | 689 | 63% |
| 1987 | 726 | 240 | 966 | 75% |
| 1988 | 1,042 | 272 | 1,314 | 79% |
| 1989 | 1,096 | 351 | 1,447 | 76% |
| 1990 | 101 | 449 | 550 | 18% |
| 1991 | 150 | 624 | 774 | 19% |
| 1992 | 150 | 624 | 774 | 19% |
| 1993 | 217 | 46 | 263 | 83% |
| 1994 | 180 | 92 | 272 | 66% |

Source: International Commission for the Conservation of Atlantic Tunas. *Statistical Bulletin*. Vol. 24-1993

Appendix 14. Republic of Korea. Total distant-water billfish catch, all oceans, by fishery and species; 1990-94.

| Fishery/Species | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|
| | *Metric tons* | | | | |
| **Tuna Longliner-Foreign Base** | | | | | |
| Swordfish | 64 | 15 | -- | -- | -- |
| Blue Marlin | 13 | -- | -- | -- | -- |
| Spearfish | 10 | -- | -- | -- | -- |
| White Marlin | 67 | -- | -- | -- | -- |
| Sailfish | 5 | -- | -- | -- | -- |
| Black Marlin | 3 | -- | -- | -- | -- |
| Other Marlin | 962 | 843 | 134 | 149 | 161 |
| **Total** | 1,124 | 858 | 134 | 149 | 161 |
| **Tuna Longliner-Home Port** | | | | | |
| Swordfish | 170 | 260 | 164 | 126 | 32 |
| Blue Marlin | 75 | 176 | 142 | 84 | 8 |
| Spearfish | 4 | 39 | 63 | -- | -- |
| White Marlin | 4 | 7 | 4 | -- | -- |
| Sailfish | -- | -- | 409 | 589 | 1,200 |
| Black Marlin | 83 | 74 | 617 | 1,375 | 483 |
| Other Marlin | 4,313 | 3,486 | 4,444 | 5,311 | 5,085 |
| **Total** | 4,649 | 4,042 | 5,843 | 7,485 | 6,808 |
| **Tuna Purse Seine** | | | | | |
| Swordfish | -- | -- | -- | -- | -- |
| Other Marlin | -- | -- | -- | -- | 10 |
| **Total** | -- | -- | -- | -- | 10 |
| **Albacore Gillnet** | -- | 15 | -- | -- | -- |
| **Grand Total** | 5,773 | 4,915 | 5,977 | 7,634 | 6,979 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1990-1995.

Appendix 15. Republic of Korea. Pacific Ocean billfish catch, by fishery and species; 1990-94.

| Fishery/Species | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|
| | *Metric tons* | | | | |
| **Tuna Longliner-Foreign Base** | | | | | |
| Swordfish | 13 | 15 | -- | -- | -- |
| Blue Marlin | 11 | -- | -- | -- | -- |
| Spearfish | -- | -- | -- | -- | -- |
| White Marlin | 63 | -- | -- | -- | -- |
| Sailfish | -- | -- | -- | -- | -- |
| Black Marlin | -- | -- | -- | -- | -- |
| Other Marlin | 354 | 162 | 80 | 79 | 44 |
| **Total** | 441 | 177 | 80 | 79 | 44 |
| **Tuna Longliner-Home Port** | | | | | |
| Swordfish | 68 | 93 | 87 | 106 | 15 |
| Blue Marlin | 75 | 165 | 110 | 84 | 5 |
| Spearfish | 3 | 30 | 63 | -- | -- |
| White Marlin | 4 | 4 | 3 | -- | -- |
| Sailfish | 5 | -- | 403 | 589 | 1,200 |
| Black Marlin | 83 | 13 | 615 | 1,375 | 483 |
| Other Marlin | 2,673 | 2,890 | 3,421 | 3,830 | 3,105 |
| **Total** | 2,911 | 3,195 | 4,702 | 5,984 | 4,808 |
| **Tuna Purse Seine** | | | | | |
| Swordfish | -- | -- | -- | -- | -- |
| Other Marlin | -- | -- | -- | -- | 10 |
| **Total** | -- | -- | -- | -- | 10 |
| **Grand Total** | 3,352 | 3,372 | 4,782 | 6,063 | 4,862 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1990-1995.

Appendix 16. Republic of Korea. Atlantic Ocean billfish catch, by fishery and species; 1990-94.

| Fishery/Species | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|
| | | | *Metric tons* | | |
| **Tuna Longliner-Foreign Base** | | | | | |
| Swordfish | 23 | -- | -- | -- | -- |
| Blue Marlin | -- | -- | -- | -- | -- |
| Spearfish | -- | -- | -- | -- | -- |
| White Marlin | -- | -- | -- | -- | -- |
| Sailfish | -- | -- | -- | -- | -- |
| Black Marlin | -- | -- | -- | -- | -- |
| Other Marlin | 204 | 502 | -- | -- | -- |
| **Total** | 227 | 502 | -- | -- | -- |
| **Tuna Longliner-Home Port** | | | | | |
| Swordfish | 87 | 150 | 17 | -- | -- |
| Blue Marlin | -- | -- | -- | -- | -- |
| Spearfish | -- | -- | -- | -- | -- |
| White Marlin | -- | -- | -- | -- | -- |
| Sailfish | -- | -- | -- | -- | -- |
| Black Marlin | -- | -- | -- | -- | -- |
| Other Marlin | 242 | 122 | 32 | -- | 92 |
| **Total** | 329 | 272 | 49 | -- | 92 |
| **Grand Total** | 556 | 774 | 49 | -- | 92 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1990-1995.

Appendix 17. Republic of Korea. Indian Ocean billfish catch, by fishery and species; 1990-94.

| Fishery/Species | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|
| | *Metric tons* | | | | |
| **Tuna Longliner-Foreign Base** | | | | | |
| Swordfish | 27 | -- | -- | -- | -- |
| Blue Marlin | 2 | -- | -- | -- | -- |
| Spearfish | 10 | -- | -- | -- | -- |
| White Marlin | 4 | -- | -- | -- | -- |
| Sailfish | -- | -- | -- | -- | -- |
| Black Marlin | 3 | -- | -- | -- | -- |
| Other Marlin | 404 | 179 | 54 | 70 | 117 |
| **Total** | 450 | 179 | 54 | 70 | 117 |
| **Tuna Longliner-Home Port** | | | | | |
| Swordfish | 25 | 17 | 60 | 20 | 17 |
| Blue Marlin | -- | 11 | 32 | -- | 3 |
| Spearfish | 1 | 9 | -- | -- | -- |
| White Marlin | -- | 3 | 1 | -- | -- |
| Sailfish | -- | -- | 6 | -- | -- |
| Black Marlin | -- | -- | 2 | -- | -- |
| Other Marlin | 1,398 | 474 | 991 | 1,481 | 1,888 |
| **Total** | 1,424 | 514 | 1,092 | 1,501 | 1,908 |
| **Albacore Gillnet** | -- | 15 | -- | -- | -- |
| **Grand Total** | 1,874 | 708 | 1,146 | 1,571 | 2,025 |

Source: *Statistical Yearbook of Agriculture, Forestry, and Fisheries*, Ministry of Agriculture, Forestry, and Fisheries, 1990-1995.

Appendix 18. Republic of Korea tuna longliner companies.

Boseong Fisheries
TEL (051) 243-2761
FAX (051) 243-2761

Daehae Fisheries
TEL (051) 253-0778
FAX (051) 245-0222

Daerim Corporation
482-2, Pangbae-dong, Socho-ku, Seoul
TEL (02) 523-4500
FAX (02) 523-8900

Dongah Flour Mills Co.
TEL (02) 789-5071
FAX (02) 784-9757

Dongnam Co.
TEL (051) 242-4281
FAX (051) 242-4283

Dongwon Fisheries Co.
5Fl., Dongju Bldg, 824-24, Yoksam-dong, Kangnam-ku Seoul
TEL (02) 564-8000
FAX (02) 564-1300

Dongwon Industrial Co., Ltd.
275, Yangjae-dong, Socho-ku, Seoul
TEL (02) 589-3000
FAX (02) 589-3289

Dongyang Fisheries
TEL (051) 412-5401
FAX (051) 412-2623

Gaeyang Heungsan
TEL (02) 733-6715
FAX (02) 739-5227

Hanil Deep-sea Fisheries
TEL (02) 752-2968
FAX (02) 755-2208

Hansung Enterprise Co., Ltd.
Hansung Bldg., 88, Samsong-dong, Kangnam-ku, Seoul
TEL (02) 511-7887
FAX (02) 511-0701

Ilheung Co.
TEL (02) 454-8891
FAX (02) 454-8898

Jaiwon Industrial Co., Ltd.
Doryum B/D #60, Doryum-dong, Jongro-ku, Seoul
TEL (02) 732-6241
FAX (02) 732-3998

Jinyang Fisheries
TEL (02) 523-4500
FAX (02) 523-8900

Nambug Fisheries Co., Ltd.
85-3, Sosomun-dong, Chung-ku, Seoul
TEL (02) 774-5300
FAX (02) 752-2541

Ohyang Fishery Co., Ltd.
76-3, Taepyongno 1-ga-dong, Chung-ku, Seoul
TEL (02) 732-6500
FAX (02) 732-6787

Poongsan Fisheries
TEL (02) 540-4871
FAX (02) 540-4875

Sajo Industrial Co.
157, 2-ga-dong, Chungjong-ro, Sodoemun-ku, Seoul
TEL (02) 313-9000
FAX (02) 313-8079

Sajo Cold Storage
TEL (02) 563-9001
FAX (02) 563-9007

Seyang Fisheries
TEL (02) 784-0141
FAX (02) 785-4575

Silla Trading Co., Ltd.
286-7, Sokchon-dong, Songpa-ku, Seoul
TEL (02) 417-7171
FAX (02) 417-5616

Wooyang Fisheries Co., Ltd.
TEL (02) 585-2451
FAX (02) 581-2455

# Taiwan

Taiwan's distant-water longliner fleet has been one of Asia's biggest producers of tuna and billfish. Swordfish, which is caught incidentally in the distant-water tuna longliner fishery, has posted dramatically increased catches in the 1990s, particularly in the Indian Ocean. Taiwan also catches a significant amount of billfish, including swordfish, in its offshore tuna longliner and coastal harpoon fisheries.

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## I. Fleet

Taiwan began its tuna/billfish fisheries around 1913 when tuna fishing techniques were introduced by Japan. During this early period, Kaohsiung was the main base port with fishing activities limited primarily to coastal waters off Kaohsiung. As fishing technology expanded, Taiwan tuna vessels began fishing off Luzon Island (Philippines) and then in the South China Sea. Taiwan vessels soon after began fishing in the Banda and Flores Sea of Indonesia (1954), in the Eastern Indian Ocean (1956), and in the Mediterranean/Atlantic (1960). Tuna catches have risen dramatically in the past 35 years, from 25,000 in 1962 to over 300,000 t in 1993 for all gear types in all Oceans.[1] Taiwan longliner, driftnet, and harpoon fleets have caught tuna and billfish in both distant-water and coastal fisheries. At present, Taiwan deploys a distant-water longliner fleet, and coastal longliner and coastal harpoon fleets.

### Distant-water Longliners

Taiwan distant-water tuna longliner vessels began fishing in 1963, when the distant-water fleet began supplying yellowfin and albacore tuna to canneries in American Samoa, Fiji, and Vanuatu.[2] Until the mid-1970s, the majority of the catch was exported to the international tuna canning industry. Low prices for canned tuna and the development of ultra-low temperature freezing technology during the mid-1970s provided Taiwan with the impetus to initiate an ultra-low temperature tuna freezing longliner fleet which continues to be Taiwan's most lucrative distant-water tuna fishing fleet. This fleet is capable of catching and storing large amounts of high-quality *sashimi*-grade tuna for export to the lucrative Japanese *sashimi* market.[3]

The Taiwan distant-water longlining fleet (larger than 100 GRT) increased during the 1980s, peaking at 841 vessels in 1990 (appendix 1). Figures for 1993 and 1994 indicate a decrease to 681 vessels in 1993, with a slight increase in 1994 to 693 vessels. In 1995, the number of longliners remained stable at 692 vessels. Taiwan longliners fish in the Atlantic, Pacific, and Indian Oceans, with the majority of the catch consisting of albacore tuna.

The Taiwan Distant-water Fisheries Association reported in June 1992 the following breakdown for 650 Taiwan distant-water tuna vessels affiliated with the Association: 313 freezer longliners (400-700 GRT vessels equipped with super low-temperature freezers for *sashimi* tuna production), 216 albacore longliners, 46 purse seiners, and 75 driftnet vessels. According to the Association, all Taiwan distant-water longliner owners are members of the Association, indicating Taiwan official figures for 1991 (759 vessels) may have included tuna longliners engaged in coastal operations.[4] In a 1995 report on the Taiwan tuna industry, the following fleet breakdown was reported: 334 freezer longliners, 243 albacore longliners, and approximately 450 small (50-70 GRT) fresh sashimi longliners operating in Pacific tuna fisheries.[5]

In the **Atlantic Ocean,** 172 Taiwan longliners fished for tuna in 1994. The number of Taiwan longliners in the Atlantic Ocean has varied between 111 vessels and 172 vessels since 1987 (appendix 2). The majority of the longliners are 200-500 GRT class vessels with the number of larger longliners (over 500 GRT) increasing to an all-time high of 68 vessels in 1994.[6] Approximately 80 of these longliners are actually based in this region, with the home ports for the rest in Taiwan. Taiwan vessels active in the North Atlantic are based in Las Palmas (Spain), St. Martin (Trinidad), and in St. Lucia, while vessels active in the South Atlantic are based in Cape Town (South Africa), and Montevideo (Uruguay).[7]

**Indian Ocean:** Taiwan tuna fisheries in the Indian Ocean began before 1963. Large and small Taiwan longliners are deploying conventional and deep longlining gear in the Indian Ocean. Conventional longlining operations, popular until the late 1970s, targeted albacore and fish mainly in grounds south of 10 degrees South. Deep longlining operations target bigeye and yellowfin tuna and fish mainly in tropical and subtropical regions north of 15 degrees South. Most of these vessels were chartered to Indonesian companies or based out of Penang, Malaysia. Other species caught incidentally in this fishery include swordfish and other billfish. The fishing bases for Taiwan vessels operating in the Indian Ocean are Singapore, Bangkok, Reunion, Penang, and Port Louis (Mauritius).

Since 1991, a number of small Taiwan longliners have operated in Indonesian waters off the south and southwestern coasts of Java and Sumatra, and probably the Andaman Sea. These small longliners formerly fished in coastal Taiwan and southwestern Pacific waters before moving to the Indian Ocean.[8]

Large-scale pelagic driftnetting was also conducted by Taiwan vessels in the Indian Ocean from 1983 to 1992. Albacore was the main target species for this fishery which took place mainly between 30 degrees South and 45 degrees South where immature albacore were abundant.[9] This fishery is no longer conducted in accordance with the United Nations moratorium.

The number of Taiwan longliners operating in the Indian Ocean has nearly doubled since the mid-1980s, from 127 vessels in 1985 to 253 vessels in 1991 (appendix 2; Note: Data for 1992-95 is not available). As is the case in the Atlantic, vessels tend to be of the 200-500 GRT class, with a marked increase in the number of over 500 GRT vessels since 1989.[10] Approximately 25 Taiwan albacore longliners are based in this region, operating out of Singapore, Mauritius, and Reunion.[11] Taiwan freezer longliners, which fish largely in equatorial waters and the EEZs of Pakistan and Oman, are based in Singapore, Port Louis (Mauritius), Karachi, Madras, and Goa.

In the **Pacific Ocean**, the Taiwan longliner fleet consists of two groups: the smaller (less than 100 GRT) vessels, based in the Federated States of Micronesia, Guam, the Republic of the Marshall Islands, Palau, and Taiwan which target bigeye and yellowfin tuna for the Japanese *sashimi* market; and larger vessels (150-250 GRT) based in American Samoa and Fiji, which target albacore for canning.[12] The number of Taiwan distant-water longliners operating in the Pacific Ocean between 1992-94 were 92, 119, and 122, respectively. The number of Taiwan offshore/coastal longliners operating in the central-western Pacific decreased from 1,898 vessels in 1992 to 1,791 vessels in 1993.[13] Recent reports in the Japanese tuna industry press indicate that Taiwan distant-water longliners may be moving from fisheries in the Atlantic and Indian Oceans to the Pacific, due to declining tuna catches in these grounds. The general opinion seems to be that growth in Atlantic and Indian Ocean fisheries is limited, while catch rates in the Pacific have surpassed those in the other two oceans.[14]

**Offshore Longliner Fishery:** Taiwan has a large number of tuna longliners less than 100 GRT which fish in the nearshore and coastal waters of Taiwan (2,187 in 1995). Most of these vessels are between 20-50 GRT and operate off eastern Taiwan along the edge of the Kuroshio current in pursuit of large tuna species. This fleet catches a significant amount of billfish and other large pelagic species as a bycatch.[15]

**Distant-water Driftnet Fishery:** Taiwan vessels were engaged in this fishery in the Indian and Pacific Oceans until the United Nations moratorium on highseas large-scale pelagic driftnet fishing took effect in 1993. The number of Taiwan driftnet vessels fishing in the North Pacific and Indian Oceans totaled 221 vessels in 1991, and decreased to 95 vessels in 1992, the final year of the driftnet fishery.[16] These vessels targeted albacore tuna, swordfish, shark, and squid. Squid was the primary target species in the North Pacific fishery conducted between May and October, and highly migratory species were the primary target species in the Indian Ocean fishery conducted between November and March. The smallest Taiwan driftnet vessels were 100-199 GRT class, with most driftnet vessels ranging from 200-399 gross registered tons.

Following the United Nations General Assembly (UNGA) Resolution No. 44/225 on large-scale pelagic driftnet fishing, adopted on December 22, 1989, and the follow-up resolution No. 46/215, which established a driftnet fishing moratorium effective January 1, 1993, Taiwan officials took steps to reduce the high-seas driftnet fleet by 50 percent before June 30, 1992, and to impose the UNGA moratorium by December 31, 1992.

In July 1991, Taiwan officials introduced the following measures aimed at reducing the driftnet fleet size and encouraging conversion to alternative fishing methods;

1) priority buy-back of driftnet vessels at $480 per GRT, with a maximum compensation of $200,000 per vessel (1992/93 total budget is $22.3 million),

2) provision of low-interest loans to owners of driftnet vessels less than 15 years old to enable them to covert to alternative fishing methods, with a maximum loan of $200,000 per vessel at an interest rate of 5.25 percent,

3) prior to December 31, 1992, provision for driftnet vessel owners to use their driftnet vessel construction quota for construction of tuna purse seiners having at least 1,000 GRT, and

4) creation of a special fund to promote consumption of species caught by alternative fishing methods (e.g. squid, tuna, and saury). Taiwan officials reportedly have bought-back 76 older driftnet vessels which have been used as artificial reefs along the southern coast, and financed gear conversion for 18 vessels, with 54 additional loan applications under review.[17]

In accordance with the UNGA Resolution 46/215, Taiwan licensed 64 North Pacific (half the 1991 total) and 31 Indian Ocean (one-third the 1991 total) driftnet vessels in 1992. Taiwan officials announced on December 9, 1992, that no Taiwan driftnet vessels would be licensed in 1993. As of November 11, 1992, no driftnet vessels were permitted to apply for port clearance for distant-water fisheries. The 64 North Pacific driftnet vessels were required to return to Taiwan for inspection by December 15, 1992. The 31 Indian Ocean vessels were required to cease fishing and return to Taiwan by December 31, 1992, or call at the ports of Singapore and Cape Town, South Africa, for inspection to ensure that driftnet equipment and gear had been dismantled and properly disposed. These vessels may continue fishing by other methods in the Indian Ocean or the southwestern Atlantic only after inspection.

The Japanese tuna industry was concerned that many former Taiwan driftnet vessels would be converted to tuna longlining, thus exacerbating the continuing problem of oversupply on the Japanese *sashimi* tuna market. Taiwan has assured Japan that any former driftnet vessels converted to tuna longlining would be older vessels based in Taiwan because of their dated ammonia-freezing technology. Newer driftnet vessels were expected to be converted to squid jigging.[18]

With the advent of the traditional May-September North Pacific driftnet season in 1993, there were press reports which claimed that Taiwan driftnet vessels were still fishing.[19] There were no confirmed cases of driftnet fishing by Taiwan-flag vessels between 1993 and 1995. In 1996, however, a Taiwan-flag vessel, *Charngder No. 2*, was confirmed to be using driftnet gear in the North Pacific.

**Coastal Harpoon Fishery:** Harpoon fishing for billfish was introduced by Japan in 1913. Most of these vessels are made of wood with a capacity between 5 and 10 GRT. This fleet has mainly operated in the eastern region of Taiwan, from the southern ports of Kaohsiung and Taitung, and the northern port of Keelung. [20]

The size of this fleet fluctuated between 329 vessels and 453 vessels between 1985 and 1991. Since 1991, however, the size of the fleet decreased sharply to 211 vessels in 1992, 190 vessels in 1993, 181 vessels in 1994, and 171 vessels in 1995 (appendix 3).

**Labor Problems**: As is the case with its ROK and Japanese competitors, Taiwan tuna fleets face a shortage of domestic labor. Official statistics indicate the number of distant-water fishery workers decreased between 1989-94 (appendix 4), but increased in 1995.

Taiwan officials have announced plans to allow 50 percent of the crew on Taiwan distant-water tuna vessels to be comprised of foreign workers (foreign crews were limited to 33 percent in the past). Taiwan tuna vessels have employed crews from China, the Philippines, Indonesia, and Vietnam, but the need for foreign crew members has increased as fewer Taiwan citizens choose to work on fishing vessels.[21] Despite these efforts, though, it is expected that developing Asian countries such as China and Indonesia will become important

players, particularly in distant-water tuna fisheries, thanks largely to their comparatively cheap and abundant labor.[22]

**Shipbuilding**: Taiwan no longer officially promotes building fishery vessels and is, in fact, actively discouraging investment in this sector. Taiwan officials invested $221 million in building and upgrading fishing vessels in 1990, but spent only $69 million for this purpose in 1991. Since 1991, Taiwan has instituted a freeze on applications for new offshore fishing vessels and imposed a zero-growth policy on the distant-water fleet; i.e. only when an old vessel is retired will a new vessel be approved. Taiwan officials have also forbidden the purchase of foreign fishing vessels.[23]

The number of Taiwan shipyards building and repairing fishing vessels has decreased dramatically, from 842 in 1989 to just 228 in 1992. Accordingly, the cumulative capacity of fishing vessels has also dropped by over six times during those three years. It is evident that Taiwan official policies which discourage new investment in the fisheries sector are having a profound effect on the Taiwan fish vessel building industry. As in Japan and the ROK, Taiwan shipbuilders are constructing cargo and passenger vessels instead of fishing vessels.

Taiwan officials are, however, constructing fishery enforcement vessels to strengthen their ability to regulate their fishing fleets. Taiwan planned to deploy 3 long-range and 2 coastal patrol vessels by October 1992. The vessels were scheduled to be constructed in Taiwan shipyards at an estimated cost of $23 million. The Taiwan Council of Agriculture will oversee this project which is primarily designed to enhance Taiwan's ability to enforce international fishery agreements, including the large-scale pelagic driftnet moratorium proclaimed by the United Nations. The annual cost of operating the 5 vessels is estimated at $4.6 million.[24]

Statistics on the construction of new tuna longliners and harpoon vessels in Taiwan indicate a pronounced decline (appendices 5 and 6). The number of new longliners built between 1985 and 1990 ranged from a low of 36 vessels in 1986 to a high of 88 vessels in 1989. Since 1990, however, no more than 14 new longliners have been built in any year. The few longliners which have been built are in larger size classes of at least 200GRT. Statistics on the construction of new harpoon vessels also indicate declining effort in this fishery--just five new harpoon vessels have been built since 1987.

**Regulation of Fleet Size**: Taiwan official measures described in the previous sections on driftnet fishing and promotion of shipbuilding provide the best examples of official regulation of fleet size. It should be noted, however, that the buy-back scheme mentioned in relation to driftnet vessels is, in fact, open to all fishing vessels, with driftnet vessels given first priority.

**Vessel Exports:** According to official statistics, Taiwan exported no fishing vessels between 1985-89 and during 1992. In 1990, two vessels were exported to Honduras with a total capacity of 403 GRT and worth $3.2 million, three vessels were exported to Indonesia with a total capacity of 120 GRT and worth $1.5 million, and one vessel was exported to Pakistan having 85 GRT and worth $200,000.

Trade statistics for 1991 show that one vessel, having 330 GRT and worth $4.7 million was exported to Mauritius, and one vessel of 306 GRT and worth $800,000 was exported to Panama. The low trade value figure for the second vessel suggests that, unlike in Japan, Taiwan vessels are either being scrapped, kept in port, or used for other purposes.[25]

Although not being exported, many Taiwan fishing vessels, especially tuna longliners, are apparently being registered with foreign "flag-of-convenience" nations. One of the leading flag-of-convenience states is Honduras, where at least 70 Taiwan-owned 700-1,000 GRT class tuna longliners are registered.

## II. Ports

The bulk of the Taiwan tuna/billfish catch is landed at overseas ports (See "Transshipments" section below for further information). Domestic Taiwan tuna and billfish landings take place at the ports of Kaohsiung (southwestern Taiwan), Ilan (northeast), Pingtun (south), and Taitung (southeast). The most recent landing statistics indicate that Kaohsiung is the major domestic port for the distant-water longline fleet, Pingtung is the major port for the coastal longliner fleet, and Ilan is the major port for the coastal harpoon fleet.

For the distant-water longliner fleet in 1995, 79 percent of the catch was landed overseas, with 14 percent landed in Kaohsiung, and 7 percent landed in Pingtung. For the coastal tuna longliner fleet, 63 percent of the catch was landed in Pingtung, 8 percent in Taitung, 27 percent in Ilan, and 2 percent in Kaohsiung. For the coastal

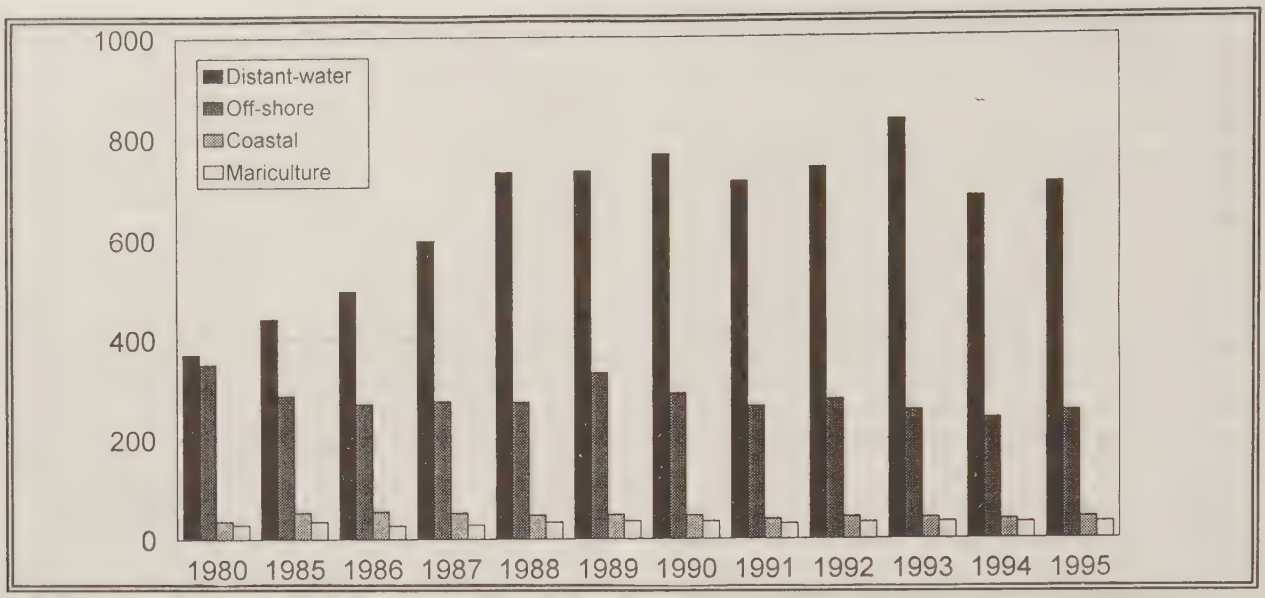


**Figure 1**--Taiwan total fisheries catch, by type of fishery and quantity (in thousands of metric tons), 1980, 1985-95. Source: Taiwan Fisheries Bureau

harpoon fleet, 69 percent of the total catch was landed in Ilan, 22 percent in Taitung, and 9 percent in Pingtung.[26]

Taiwan statistics indicate that in 1995, 91 percent of swordfish landings took place overseas, with the remaining 9 percent landed in Taiwan ports.[27] Of the 9 percent, domestic landings took place at the following ports: Kaohsiung City (3 percent), Pingtung (6 percent), Taitung (negligible), and Ilan (negligible).

## III. Catch

Taiwan's **overall** catch has fluctuated between 1.0 and 1.5 million tons since 1985 (appendix 7, figure 1). Recently released statistics for 1995 indicate the Taiwan total catch was 1.3 million t, a slight rebound from the relatively low catch of 1.26 million t recorded in 1994. Taiwan's distant-water fisheries catch has also fluctuated during this time frame, increasing in 1992 and 1993, but falling in 1994 to 684,000 t, its lowest level since 1987. Figures for 1995 indicate an increase again to 710,000 tons. Both offshore and coastal fisheries catch generally decreased between 1989 and 1994, but both fisheries posted increased catches in 1995.

Overall catch trends for the gear types which capture tuna and billfish have generally been inconclusive (appendix 8). Distant-water tuna/billfish catch has fluctuated between 300,000 and 500,000 t since 1988. Distant-water longliner catch has fluctuated between 135,000 and 300,000 t during this time frame. Purse seine catch has posted increased catches each year since 1991, with a 1995 catch of 187,000 tons. As mentioned earlier, the driftnet fishery ceased in 1993 but recorded a peak catch of over 125,000 t in 1990 before declining in following years.

The offshore tuna longliner catch ranged between 30,000 to 35,000 t between 1987 and 1989, but did not exceed 30,000 t again until 1995 when total catch increased greatly to 33,000 tons. The coastal harpoon fishery has steadily declined from a catch in excess of 7,000 t in 1980 to a catch of slightly less than 1,300 t in 1995.

When looking solely at the swordfish catch posted by these fisheries (appendix 9), the most remarkable statistic is swordfish catch recorded by the distant-water longliner fishery. This fishery posted dramatic increases from 2,900 t in 1992 to over 8,400 t in 1994. In 1995, catch from this sector more than doubled to nearly 20,000 tons. Distant-water purse seiners and driftnet vessels recorded no swordfish catch between 1993-95, while offshore longline tuna and coastal harpoon swordfish catches have fluctuated with no clear trends emerging (although a significant decrease in harpoon catch in 1995 should be noted).

**Billfish** catch by Taiwan vessels has ranged from 16,000 to 39,000 t between 1980 and 1995 (appendix 10). The

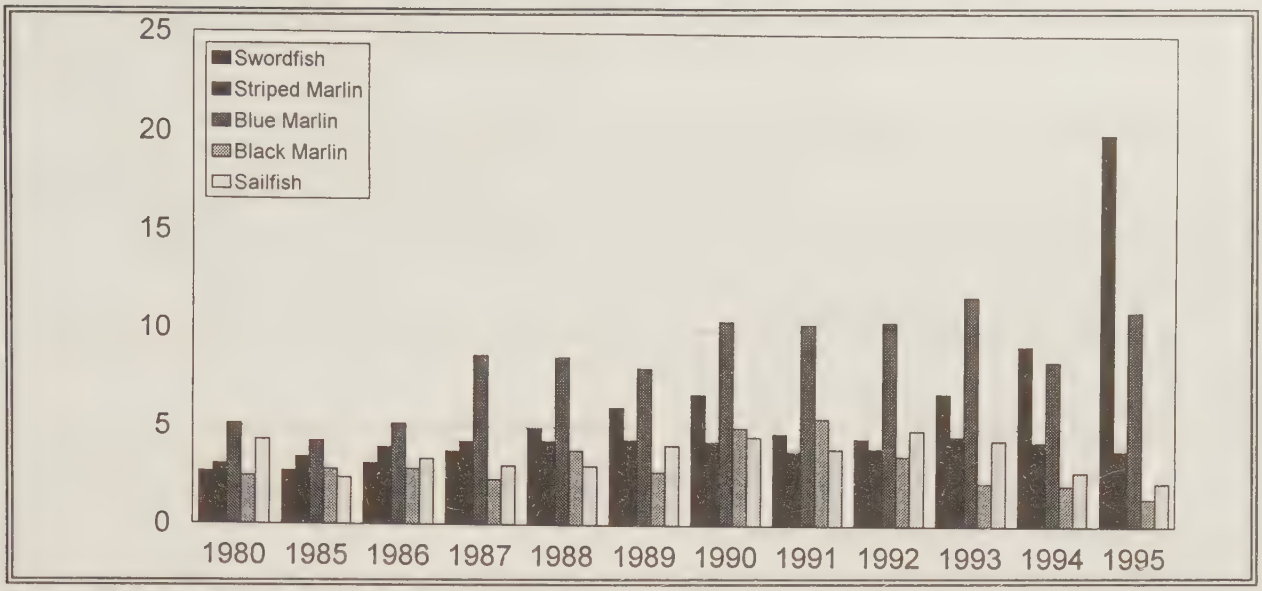


**Figure 2**--Taiwan's total catch of billfish, by species and quantity (in thousands of metric tons), 1980, 1985-95. Source: Taiwan Fisheries Bureau.

overall catch between 1990 and 1994 ranged between 27,000 and 31,000 tons. In 1995, however, a sharp increase in swordfish landings combined with the relatively stable catch of other billfish species resulted in an overall billfish catch increase to nearly 39,000 tons.

Total swordfish catches have increased greatly since 1993 (figure 2). In 1994, swordfish catch increased to 9,225 t, a 27 percent increase over 1993. The 1995 swordfish catch of 20,051 t represented more than a twofold increase in just one year. The percentage of total billfish catch comprised of swordfish ranged between 15 and 24 percent of the total during 1980, and 1985-93, but jumped up to 34 percent in 1994 and 52 percent in 1995. Equally significant, swordfish exceeded blue marlin as the most often caught billfish species by Taiwan vessels for the first time in 1994 and 1995.

Looking at swordfish catch reported to the Food and Agriculture Organization (FAO), one sees varying trends in Taiwan's catch broken down by ocean (appendix 11, figure 3):

In the **Pacific Ocean**, the bulk of Taiwan catches have taken place in Area 61 (northwest Pacific--including coastal Taiwan waters), with lesser catches occurring in Area 71 (southwest Pacific), Area 77(east central Pacific), and Area 81 (southeast Pacific). Between 1980 and 1994, annual Pacific Ocean swordfish catch fluctuated from a low of 208 t in 1991 to a high of 3,300 t in 1990. In 1995, however, a significant increase to 7,700 t was reported with 6,000 t caught in Area 61.

In the **Indian Ocean**, catches in Area 51 (western Indian Ocean) have been generally increasing since 1989, while catches in Area 57 (eastern Indian Ocean) have fluctuated since peaking in 1989. Taiwan swordfish catch in Area 51 has increased dramatically between 1991-95, with the 1995 catch of nearly 9,000 t more than quadrupling that recorded in 1990.

**Atlantic Ocean** catches increased significantly in 1991 and 1992, largely due to increased catches in Areas 31 (central west Atlantic-including the Caribbean) and 41 (southwestern Atlantic). Taiwan vessels have also reported catches in Areas 21 (northwestern Atlantic), 27 (northeastern Atlantic), 34 (central east Atlantic), and 47 (southeastern Atlantic). The 1993 catch of 749 t, however, was only half that reported in 1992, with reduced catches in each of the above Areas. In 1994, catch in the Atlantic rose sharply to nearly 2,600 t with big catch increases in Areas 31, 34, 41, and 47. Figures for 1995 are similar to 1994 with total Atlantic catch increasing slightly to 2,641 tons.

Taiwan Fisheries Bureau statistics indicate overall distant-water swordfish catch varied between 4,500 and 6,000 t between 1989 and 1993, with a sharp increase to 8,400 t in 1994 (appendix 12). As might be expected, this increase is due solely to increased longliner catch with the phase-out of the driftnet fleet and zero swordfish catch

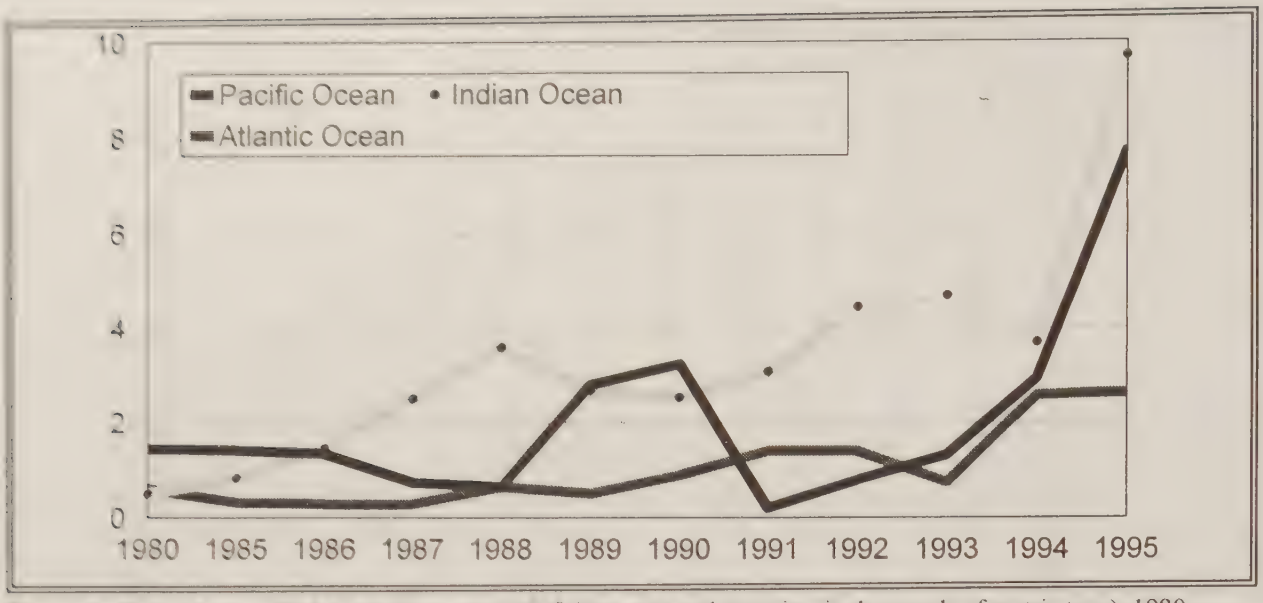


**Figure 3**--Taiwan's swordfish catch by major FAO fishing area and quantity (in thousands of metric tons), 1980, 1985-95. Source: FAO.

reported by the purse seine fleet. This data also indicates a sharp increase in swordfish catch by Taiwan longliners fishing in the Atlantic Ocean, from just 755 t in 1993 to 3,056 t in 1994. Data for 1995 were not published by the Taiwan Fisheries Bureau.

**Distant-water longliners**: Taiwan distant-water longliner catch of billfish has ranged between 5,000 and 32,000 t since 1980 (appendix 13). Swordfish has comprised a significant portion of the total billfish catch, ranging from 20 to 61 percent. Swordfish catches for this fishery rose significantly in 1994 and 1995. The increase in 1994 and 1995 is particularly notable since other billfish species posted relatively unchanged or decreased catches.

Distant-water longliner catch in the **Pacific Ocean** is comprised largely of the following species: albacore, yellowfin tuna, bigeye tuna, and blue marlin (appendix 14). Swordfish catch has comprised a small proportion of total catch (1 to 2 percent) and ranged between 177 t and 869 t from 1989 to 1994. Data for 1995 were not published by the Taiwan Fisheries Bureau.

**Indian Ocean** catch for this fleet showed a tremendous increase in 1993 (appendix 15). Taiwan longliner catch in the Indian Ocean is comprised largely of yellowfin tuna, bigeye tuna, albacore, and billfish species (particularly swordfish, striped marlin, and blue marlin). Swordfish catch has risen steadily since 1989, increasing from approximately 2,700 t to over 5,800 t in 1992. In what is probably an editorial oversight, no swordfish catch data were reported for Taiwan longliners during 1993 in the Indo-Pacific Tuna Program yearbook. Data from the Taiwan Fisheries Bureau indicate Taiwan longliner swordfish catch totals in the Indian Ocean declined somewhat in 1993 and 1994, but remained at a relatively high level (3,459 t in 1993 and 3,702 t in 1994).

Data for the Taiwan distant-water tuna longliner fleet operating in the Indian Ocean indicate swordfish has comprised a large portion of overall billfish catch in the western Indian Ocean (FAO Area 51), ranging from 31 percent to as much as 61 percent of the total (appendix 16). Swordfish catch has increased remarkably in this area since 1989, from 1,400 t to nearly 5,200 t in just three years.

Swordfish has also comprised a large portion of eastern Indian Ocean (FAO Area 57) longliner catches, ranging from 41 to 59 percent of the total since 1988 (appendix 17). Swordfish catch in this area has fluctuated between 400 and 1,200 tons, with no clear upward or downward trend.

In the **Atlantic Ocean**, ICCAT data show that Taiwan longliners have mainly caught albacore, bigeye, and yellowfin tuna (appendix 18). With regard to billfish and swordfish, this data indicates that swordfish comprised between 21 percent and 63 percent of all billfish catch, with particularly large catches posted in 1991, 1992, and 1994 (appendix 19). Swordfish catch totalled 749 t in 1993, approximately half its 1992 level of 1,403 tons. In

both 1994 and 1995, however, catch levels increased significantly to approximately 2,600 tons (see Overview chapter appendix 4).

**Distant-water driftnet**: Billfish catches for this fishery ranged from 1,000 to 5,000 t between 1985 and 1992, the final year that this fishery was conducted (appendix 20). Swordfish and blue marlin were the two billfish species most often caught in this fishery. Swordfish catch ranged from a low of 114 t in 1986 to a high of 1,182 t in 1990, and comprised between 8 and 25 percent of the total billfish catch.

Data for the distant-water driftnet fleet in the Indian Ocean indicates a limited amount of swordfish was caught in this fishing ground. Catches in Area 51 (western Indian Ocean) ranged from 2 to 51 t (appendix 21), while catches in Area 57 (eastern Indian Ocean) ranged from 4 to 250 t (appendix 22). Swordfish comprised a major portion of the total billfish catch, particularly in the eastern Indian Ocean.

The **offshore tuna longliner** fishery's total catch has fluctuated between 20,000 and 35,000 t since 1980. Billfish catch by this fishery has ranged between 2,900 t and 6,200 t, with swordfish making up between 9 and 28 percent of the total billfish catch (appendix 23). No clear catch trends emerge from the Taiwan data for this fishery, but catches were at comparatively high levels in 1992 and 1993, fell slightly in 1994, and rose slightly in 1995. Offshore tuna longliner catch of swordfish has fluctuated during the past 15 years between a low of 456 t in 1986 and a high of 1,390 t in 1989. Blue marlin has traditionally been the billfish species most often caught in this fishery.

The overall catch for Taiwan **coastal harpoon** fisheries has declined to just under 1,300 t in 1995 after peaking at 7,200 t in 1980. Billfish comprises a significant amount of this catch, with catches ranging from a low of 1,100 t in 1993 to a high of 2,600 t in 1986 (appendix 24). Coastal harpoon catch of swordfish has fluctuated between a low of 14 t in 1995 and a high of 287 t in 1992. Swordfish comprised between 4 and 10 percent of the total billfish catch until 1992, 1993, and 1994 when this figure jumped to 19, 17, and 17 percent, respectively. In 1995, however, this figure fell to just one percent of the total swordfish catch in this fishery.

## IV. Transshipments

Taiwan published data on overseas landings between 1989 and 1994. The data for swordfish indicate a significant amount of foreign landings took place in ports on the **Indian Ocean** during 1993 and 1994 (appendix 25). The bulk of these landings took place at the ports of Port Louis (Mauritius), Singapore, Reunion, and Shimizu (Japan-Indian Ocean transshipments). Other Indian Ocean landings took place in Durban (South Africa), and Kurihama (Japan-Indian Ocean transshipments). Total Indian Ocean landings ranged from 400 to 1,000 t between 1989-92, nearly quadrupled in 1993 to 3,500 t, and remained high in 1994 at 3,700 tons.

In the **Atlantic**, landings have taken place in Las Palmas (Spain), Saint Martin, Cape Town (South Africa), Montevideo (Uruguay), Port of Spain (Trinidad and Tobago), Brazil, and Shimizu (Japan-Atlantic Ocean transship). Total swordfish landings in the Atlantic ranged from 500-800 t until 1994, when reported landings quadrupled to 3,056 tons. Ranked by the amount of billfish landed, the leading Atlantic ports for distant-water Taiwan longliners were: Shimizu (Atlantic Ocean transship), Cape Town, Brazil, Port of Spain, Montevideo, Las Palmas, and Saint Martin.

As might be expected, there is a lower level of overseas landings in the **Pacific**. Total swordfish landings ranged from 83 to 245 t between 1989 and 1994. Overseas landings have taken place at the following ports: Samoa (unspecified, but presumably American Samoa), Fiji, Shimizu (Japan), Guam, Hawaii, Kurihama (Japan), and Montevideo (Uruguay--Pacific Ocean transship). The only two of these ports registering landings each year were Samoa and Fiji, with the most landings taking place at Samoa each year (ranging from 52-124 tons).

## V. Companies

There are five major Taiwan companies involved in tuna fishing: FCF Fishery, Taiwan Ming Tai Company, Ting Hong Oceanic Enterprise, Tri-Marine International, and Unifishery. Contact information for some of these companies as well as for important Taiwan fishery associations is given in appendix 26.

## VI. Domestic Consumption

Taiwan supply price data on swordfish sold in the major markets of Kaohsiung and Tungkang is available from 1989 (appendix 26). This data indicates that the price for swordfish in Taiwan has ranged from a low of $1.28 per kg to a high of $3.38 per kilogram. Between 1993 and 1995, both supply and prices were at somewhat depressed levels. No species-specific data on swordfish consumption in Taiwan is available.

## VII. Exports

Taiwan exports swordfish to the three major markets: the European Union (EU), Japan, and the United States.

**European Union:** Taiwan has exported swordfish to the EU in all four of the EU swordfish commodity forms: fresh, frozen, frozen fillet, and frozen meat. The bulk of these exports have been frozen swordfish, with exports fluctuating between 700 and 1,800 t between 1991 and 1995 (Overview chapter, appendix 14).

**United States:** U.S. trade statistics indicate that Taiwan was a significant supplier of fresh swordfish in 1985 and 1986, totaling between 1,200 and 1,400 t, but that fresh imports have decreased considerably since then (appendix 28). With regard to frozen product, Taiwan was the leading exporter of frozen swordfish to the U.S. market in 1993 and 1994. U.S. imports of frozen Taiwan product were at relatively low levels until 1993 when they began enjoying a resurgence, totaling 198 t in 1993 and 239 t in 1994. Data for 1995, however, show a significant decline as Taiwan exported just 57 t of frozen product to the United States.

**Japan:** Taiwan's longliners provided ever-increasing supplies to Japan's tuna/billfish markets until recently when the Taiwan tuna industry agreed to a voluntary 99,000 t annual cap on exports. Taiwan's tuna/billfish exports have been dominated by yellowfin and bigeye tuna, but billfish (including swordfish) has comprised a significant proportion of these exports (appendix 29).

Taiwan has been a top supplier to the Japanese billfish (including swordfish) market in each of Japan's three billfish trade commodity categories; fresh, frozen, and frozen fillets. Taiwan has been far and away the leading supplier of fresh or chilled billfish (including swordfish) to Japan (Japan chapter, appendices 37 and 38). Since 1985, exports have ranged between 800 and 1,700 t, more than double that of the number two supplier, the Philippines. In the 1990s, exports have fluctuated between 1,000 and 1,500 t with no clear upward or downward trend.

Taiwan is also the dominant exporter on the Japanese frozen billfish (including swordfish) market (Japan chapter, appendices 39 and 40). Exports in this category have ranged from an anomalous low of 3,550 t in 1988 to a high of 8,160 t in 1995. Exports in this category have been at a particularly high level since 1992--exceeding 6,300 t each year. Taiwan's exports to Japan far exceed that of its major competitors--the ROK, Panama, and Honduras (the latter two countries' fleets largely consisting of reflagged Asian longliners).

On the frozen fillet market, Taiwan has been a top exporter, along with the ROK and Indonesia (Japan chapter, appendices 41 and 42). Taiwan exports in this category have ranged from a low of 120 t in 1992 to a high of 1,100 t in 1988. Since frozen tuna fillets were removed from this category in 1993, exports have fluctuated between 350 t and 500 t with no clear upward or downward trend.

## VIII. Research

Research on tuna and billfish is carried out primarily by scientists affiliated with the Tuna Research Center, Institute of Oceanography, National Taiwan University.

## IX. Foreign Interests

Distant-water fishing operations by the Taiwan fleet have been restricted in recent years by the imposition of 200-mile EEZs. Since future Taiwan distant-water fishing can only continue under cooperative arrangements, Taiwan has negotiated a number of fishery agreements, either directly or through private fishing organizations. Taiwan had fishery agreements or arrangements with 25 countries or areas as of the end of 1993. A total of 801 Taiwan distant-water vessels fished under these cooperative arrangements with a total 1992 catch estimated at 200,000 tons.[28]

The most common type of agreement generally requires payment of fishing fees, or establishment of joint venture operations in exchange for access to fishing grounds. Taiwan officials conduct negotiations directly with the few countries with which it has official relations.

Taiwan officials have concluded formal fishery agreements with the following nations: South Africa, the Marshall Islands, the Solomon Islands, Tonga, and Tuvalu.

Taiwan's other bilateral agreements/arrangements have been established through private organizations, such as the Overseas Fisheries Cooperation Development Council, the Taiwan Fishermen's Association, the Taiwan Deep-Sea Tuna Boat Owners Association, and private fishery companies. Taiwan currently has private-level agreements with the following countries: Palau, Papua New Guinea, Fiji, Vanuatu, the Philippines, Vietnam, Indonesia, India, Western Samoa, Pakistan, Sierra Leone, the Falkland Islands, the Cook Islands, Federated States of Micronesia, Madagascar, Argentina, Niue, Oman, Guinea-Bissau, and Brazil.[29] Detailed information is available on the following countries:

**ASIA**

**India:** Taiwan longliners have been fishing under charter to Indian companies since 1985. Most of the vessels are 200-800GRT and flying under the flags of Panama and Honduras. Yellowfin tuna makes up the majority of the catch but billfish is a significant bycatch in this fishery.[30] A total of 30 Taiwan longliners were licensed to fish in Indian waters in 1995.

**Indonesia**: Taiwan longliners are licensed by the Indonesian Government to fish in the Indonesian EEZ. The number of licensed vessels exploded from just 8 in 1988 to 70 in 1990. All of these longliners were small, in the 30-50-GRT class. In addition, a small number of vessels with flag-of-convenience registry (e.g. Panama, Honduras), were reportedly operated by Filipinos with Taiwan skippers.[31] Most of these vessels were based in Jakarta in the late 80s, but a shift by some Taiwan longliners to the port of Padang in western Sumatra was reported in 1993.[32] A total of 227 Taiwan longliners were eligible for licenses to fish in Indonesian waters in 1995.

**Malaysia**: Taiwan longliners of 75-150-GRT have been operating from the port of Penang under special arrangements with local processors and exporters since 1989. The number of vessels based in Penang and fishing in the Indian Ocean was reportedly 188 at that time.[33]

**Pakistan**: Taiwan tuna vessels have operated in the Pakistani EEZ since 1991. The number of longliners has decreased from over 50 in 1992 to around 24 in 1994. In 1992, each vessel paid a fee of $18,518, to which was added 3 percent of the Free on Board (FOB) value of fishery products exported, or approximately $16,000 per shipment. The target species are yellowfin tuna, skipjack, billfish, and sharks; 98 percent of the catch is exported to Japan. Catch statistics are not available, but fishing has reportedly been quite good in this ground.[34] Just 5 Taiwan longliners were eligible for licenses in 1995.

**Philippines**: Taiwan was reportedly seeking to establish a joint fishing venture based on a memorandum on fishery cooperation signed in 1991. The Philippines suggested an arrangement whereby the joint venture company would lease Taiwan vessels and fish with them in the Philippine EEZ.[35] A total of 4 Taiwan longliners were eligible for licenses to fish in the Philippines EEZ in 1995.

**OCEANIA**

**Cook Islands**: A total of 25 Taiwan longliners were eligible for licenses to fish in Cook Islands waters in 1995. No further details are available.

**Fiji**: Fiji licenses Taiwan longliners on an individual basis, provided these vessels land their catch in Fiji and sell it to a Fiji company. A total of 21 Taiwan longliners were leased to the Pacific Fishing Company during 1990.[36]

A report in a Taiwan newspaper states that Taiwan and Korean longliners are involved in a fresh tuna joint venture. A total of 8 Korean and Taiwan longliners are, along with 12 local vessels, operating under contract to four local fishing companies. Approximately 60 tons of tuna and billfish are landed each week, with plans to increase the number of vessels and exports to Japan in the near future.[37] A total of 16 Taiwan longliners are reportedly eligible to be licensed for fishing in Fiji waters.

**Kiribati**: Taiwan has an agreement with Kiribati which permitted 20 Taiwan longliners access to Kiribati waters for a fee of $250,000 in 1990.[38] A total of 6 Taiwan longliners may have been eligible to fish in Kiribati waters in 1995.

**Marshall Islands**: The Taiwan fishing company, Ting Hong, has taken over tuna export operations on Majuro, Marshall Islands. The company operates most of the 80 longliners fishing out of Majuro and has signed a 20-year lease worth more than $6 million to operate the fish base.

The base was formerly run by a U.S. company, MMAGF, which ran the base from 1991-95. The Majuro fishing base reportedly exports an average of 130,000 pounds of *sashimi*-grade tuna every week to Hawaii and Japan. The lease agreement between Ting Hong and the

Marshall Islands Government commits Ting Hong to make annual lease payments starting at $300,000 and invest in fish base facility improvements. The agreement also allows Ting Hong to establish a fishing operation at Enewetak atoll which has a long runway suitable for larger planes and heavy cargoes. The atoll would be used as a transshipping port for fish caught in the Marshall Islands and Micronesia.[39]

**Federated States of Micronesia (FSM)**: Taiwan concluded its first fisheries access agreement with the FSM in 1979. This private agreement granted access to 30 small Taiwan longliners which paid access fees in a lump-sum payment. The access agreement expired in 1990 and was not renewed for unknown reasons. Through a special arrangement between a foreign company and the FSM State of Pohnpei, 9 Taiwan longliners based in Pohnpei were licensed in 1991.[40] The State of Chuuk allows Taiwan tuna vessels to fish in Chuuk coastal waters and in Weno Harbor. Chuuk collects fees and hopes to accommodate larger operations when new shore facilities are built.[41]

The Ting Hong Oceanic Enterprise Company, Limited, reportedly operated 104 China-flag and Taiwan-flag tuna vessels out of Yap, Micronesia, in 1993 and planned to increase this number to 150 units by the end of 1993, and 200 vessels by the end of 1994.[42] It was reported in August 1994 that Ting Hong operated a total of 183 longliners.[43] The U.S. Embassy reported in November 1995 that Ting Hong was licensed to deploy 209 longliners in 1994, but just 140 vessels were licensed in 1995. Another Taiwan company, Union, reportedly had 5 licenses in 1994, but received none in 1995. Mainland Chinese longliner companies receiving FSM licenses were: Guangdong (40 licenses in 1994, none in 1995), Zhongyuan (40 licenses in 1994, 9 in 1995), and Micronesian Fishing Venture (37 licenses in 1994, 65 licenses in 1995).[44]

**Niue:** A total of 48 Taiwan tuna longliners were eligible for licenses to fish in Niue waters in 1995. No further details are available.

**Palau**: Taiwan vessels are fishing in Palau waters through two joint venture companies. Most operate via the Palau Marine Industries Corporation (PMIC), a private venture with Chinese/Taiwan ownership in partnership with Palauans. A total of 75 longliners (64 from Taiwan) are registered through the PMIC which pays an annual lump-sum access fee of $126,000. The other joint venture company, Palau International Traders Inc. (PITI) is a private venture with Japanese and Micronesian ownership in partnership with Palauans. A total of 54 longliners, 4 of which are from Taiwan, are registered with PITI which pays an annual lump-sum access fee of $130,500.[45] The Japanese tuna industry press reports in August 1994 that a total of 200 foreign longliners are operating in Palau, 170 from China, and 30 from Taiwan.[46]

**Papua New Guinea**: Taiwan was reportedly on the verge of signing a private fisheries agreement with Papua New Guinea (PNG) in 1992. The agreement would allow an unspecified number of Taiwan vessels access to PNG waters in exchange for a six percent tax on the cost, insurance and freight (CIF) value of fish caught in PNG waters. Taiwan has also agreed to provide $2.2 million in assistance to the Kavieng Fisheries College.[47]

The Ting Hong Company has reportedly won a bid to develop a tuna project involving air freighting fresh tuna to Japan which will be caught by 50-100 longliners. The project was scheduled to begin by late June 1995.[48]

**Solomon Islands**: The Taiwan tuna longlining company, Ting Hong, reportedly received a 4,000 t allocation for up to 100 of its longliners to fish in Solomon Islands' waters in 1995. The company reportedly stationed 37 Chinese (PRC) vessels in Honiara, which could not fish because the Solomon Islands Government had not completed its review of the Ting Hong investment proposal. In order to curtail losses, Ting Hong sent the 37 vessels to Micronesia to fish until an agreement could be formalized with the Solomon Islands Government.[49] A different report indicated that Ting Hong deployed 19 longliners in Solomon Islands waters in September 1995, with the additional 81 longliners allowable under the agreement expected to arrive at a future unspecified date. Ting Hong reportedly has a shore-based facility for packing the catch before being flown to Japan on the company's aircraft.[50]

The Solomon Islands Government reported in 1994 that a total of 20 Taiwan longliners were licensed to fish in its EEZ. These longliners belong to the Kaohsiung Fishermen's Association and pay a lump-sum access fee.[51]

**Vanuatu**: The Kaohsiung Fisherman's Association signed a fisheries cooperation agreement with Vanuatu in 1989. Taiwan longliners are each required to pay a $5,000 license fee for access to Vanuatu waters. There were 36 Taiwan longliners licensed in Vanuatu waters in 1990, with 23 licensed in 1991 and 19 licensed in 1992.[52] It is unclear why the number of vessels has decreased. More recent information indicates 33 Taiwan longliners were licensed to fish in Vanuatu waters in 1995.

**Western Samoa**: A total of 37 Taiwan tuna longliners were eligible for licenses to fish in Western Samoa waters during 1995. No further information is available.

## AFRICA/MIDDLE EAST

**Madagascar**: A total of 4 Taiwan longliners were reportedly eligible for licenses to fish in Madagascar waters in 1995. No further information is available.

**Mozambique**: A total of 4 Taiwan longliners were reportedly eligible for licenses to fish in Mozambique waters in 1995. No further information is available.

**Oman**: Taiwan-registered longliners began fishing in Omani waters in 1989. As many as 19 Taiwan longliners fished there in 1989-90, but that number decreased to 8 in 1990-91 and 11 in 1991-92. The longliners target yellowfin tuna, but also catch billfish and shark.[53] One possible reason for the reduction of effort at that time may have been pressure from the Japanese tuna industry which felt Taiwan was dumping low-quality Oman-origin yellowfin tuna on the Japanese market.[54] A more recent report indicates, however, that more than 100 longliners, mainly originating from Taiwan, operate out of Muscat under the Omani flag.[55] A total of 52 Taiwan longliners were reportedly eligible for licenses to fish in Oman waters during 1995.

**Seychelles**: A limited number of Taiwan tuna longliners have been licensed to fish in Seychelles waters. A total of 16 Taiwan longliners were registered there in 1990[56], but the number increased greatly in 1993 (136 licenses) and 1994 (86 licenses).[57]

**South Africa**: Taiwan and South Africa initially concluded a fisheries agreement in 1978 under which the Taiwan tuna fleet received catch allocations in South African waters. The most recent information indicates that 30 Taiwan longliners were issued permits to fish in South African waters in 1994. Taiwan vessels are reportedly targeting albacore, with lesser catches of yellowfin tuna, bigeye tuna, and marlin species. The Taiwan fleet reported no swordfish catch in South African waters during 1994.[58]

## LATIN AMERICA

**Brazil**: Taiwan longliners have operated in Brazilian waters under charter to Brazilian companies since 1991. In 1991, 11 longliners of the 201-500-GRT class were chartered. The number of Taiwan 201-500-GRT longliners increased to 15 in 1992. In 1993, however, 20 Taiwan longliners in the over 501-GRT class were chartered in addition to 12 longliners in the 201-500-GRT class. These longliners are based in two ports, Para and Rio Grande do Sul. The fleet's catch has increased with the fleet size, reaching 7,681 t in 1993. The catch is largely comprised of albacore, yellowfin, bigeye tuna, and swordfish. Swordfish catches comprised between 13 and 32 percent of the total annual catch during this time period.[59] A total of 20 Taiwan longliners were leased to fish in Brazilian waters during 1994; 10 from Rio Grande do Sul and 10 from Para.[60]

**Trinidad and Tobago:** Taiwan is the primary foreign fishing fleet transshipping tuna and billfish through Trinidad. Taiwan accounts for 80 percent or more of transshipped fishery products. Transshipments ranged from 300 t in 1986 to nearly 4,100 t in 1990. The transhipments consist largely of yellowfin and bigeye tuna.[61] The Trinidad and Tobago Government has reported that a fluctuating number of Taiwan and other foreign vessels use the National Fisheries Company (NFC) as a transshipment port. The transshipment port was used by 26 Taiwan vessels which landed 2,256 t of products in 1993. Over half the landings consisted of tuna species, with 18 percent of the landings made up of billfish. Swordfish landings totaled 52 tons, or just over 2 percent of the total.[62] Taiwan Government statistics indicate Taiwan vessels transhipped as much as 369 t of swordfish through Port of Spain in 1994.

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41."Federated States of Micronesia Fisheries," by Mark Wildman, NOAA National Marine Fisheries Service, *International Fishery Reports*, IFR 92/76, October 2, 1992.

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45. U.S. Office, Koror, August 3, 1993.

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Appendix 1. Taiwan. Tuna fishing vessels having over 100GRT, by number and gross registered tonnage; 1986-95.

| Vessel Type | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT | No | GRT |
| *Number of Vessels/Tonnage (thousands)* | | | | | | | | | | | | | | | | | | | | |
| Tuna Longliners | 610 | 200 | 653 | 235 | 698 | 274 | 779 | 368 | 841 | 372 | 759 | 335 | 717 | 319 | 681 | 306 | 693 | 314 | 692 | 315 |
| Driftnet | 2 | 0.5 | 2 | 0.5 | 3 | 1 | 12 | 4 | 14 | 4 | 14 | 3 | -- | -- | -- | -- | -- | -- | -- | -- |
| Tuna Purse Seine* | -- | | | | | | 19 | 18 | 35 | 31 | 46 | 45 | 48 | 49 | 48 | 49 | 49 | 50 | 49 | 49 |
| Total | 612 | 201 | 655 | 236 | 701 | 275 | 810 | 390 | 890 | 407 | 819 | 383 | 765 | 368 | 729 | 355 | 742 | 364 | 741 | 364 |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau.

* - Tuna and mackerel seiners were not distinguished until 1989.

Appendix 2. Taiwan. Distant-water tuna longliners fishing fleet; by fishing grounds and gross registered tonnage; 1980-94.

| Year | Atlantic Ocean | | | | Indian Ocean | | | | Pacific Ocean |
|---|---|---|---|---|---|---|---|---|---|
| | 50-200 GRT | 200-500 GRT | Over 500 GRT | Total Atlantic | 50-200 GRT | 200-500 GRT | Over 500 GRT | Total Indian | |
| 1980 | 21 | 146 | 1 | 168 | 39 | 72 | 1 | 112 | 182 |
| 1981 | 29 | 161 | - | 190 | 39 | 70 | - | 109 | 140 |
| 1982 | 40 | 173 | - | 213 | 52 | 75 | - | 127 | 115 |
| 1983 | 13 | 86 | - | 99 | 61 | 138 | - | 199 | 65 |
| 1984 | 12 | 104 | | 116 | 37 | 113 | - | 150 | 61 |
| 1985 | 21 | 155 | 4 | 180 | 26 | 100 | 1 | 127 | 44 |
| 1986 | 17 | 168 | 5 | 190 | 27 | 120 | 6 | 153 | 51 |
| 1987 | 9 | 127 | 4 | 140 | 21 | 128 | 19 | 168 | 60 |
| 1988 | 9 | 98 | 4 | 111 | 19 | 129 | 39 | 187 | 70 |
| 1989 | 9 | 88 | 17 | 114 | 17 | 146 | 100 | 263 | 85 |
| 1990 | 8 | 91 | 50 | 149 | 19 | 140 | 117 | 276 | 96 |
| 1991 | 14 | 97 | 24 | 135 | 12 | 130 | 111 | 253 | 82 |
| 1992 | 13 | 98 | 25 | 136 | NA | NA | NA | NA | 92 |
| 1993 | 10 | 98 | 44 | 152 | NA | NA | NA | NA | 119 |
| 1994 | 10 | 94 | 68 | 172 | NA | NA | NA | NA | 122 |

Sources: Atlantic-ICCAT Statistical Bulletin, 1992: Indian Indo-Pacific Tuna Development and Management Programme Data Summary No. 14, 1995; Pacific--Report of the Fourth Meeting of the Western Pacific Yellowfin Tuna Research Group, *Tuna Fishery Yearbook 1994*, South Pacific Commission..

Appendix 3. Taiwan. Number of harpoon fishing vessels, 1985-95.

| Year | Number | | | Total Capacity (GRT) |
|---|---|---|---|---|
| | Wooden | FRP | Total | |
| 1985 | NA | NA | 359 | 3,463 |
| 1986 | NA | NA | 394 | 4,045 |
| 1987 | NA | NA | 453 | 4,473 |
| 1988 | NA | NA | 359 | 3,646 |
| 1989 | 306 | 49 | 355 | 4,821 |
| 1990 | 294 | 35 | 329 | 3,778 |
| 1991 | 276 | 60 | 336 | 4,128 |
| 1992 | 176 | 35 | 211 | 1,980 |
| 1993 | 155 | 35 | 190 | 1,696 |
| 1994 | 140 | 41 | 181 | 1,761 |
| 1995 | 133 | 38 | 171 | 1,601 |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau..

Appendix 4. Taiwan. Number of fishery workers; 1980, 1985-95.

| Type of Worker | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Number of workers* | | | | | | | | | | | | |
| Distant-water fishery workers | | | | | | | | | | | | |
| Full-time | 27,759 | 98,458 | 36,952 | 37,668 | 38,794 | 41,490 | 36,470 | 36,692 | 31,423 | 30,966 | 30,079 | 31,970 |
| Part-time | 4,883 | 1,276 | 896 | 1,847 | 2,550 | 1,365 | 1,279 | 1,477 | 616 | 590 | 1,023 | 1,192 |
| Total | 32,642 | 99,734 | 37,848 | 39,515 | 41,344 | 43,055 | 37,749 | 38,169 | 32,039 | 31,556 | 31,102 | 33,162 |

Note: It is unclear why the number of workers was so high in 1985.
Source: *Fisheries Yearbook-Taiwan Area*, Taiwan Fisheries Bureau-1980,1985-95.

Appendix 5. Taiwan. Newly built tuna longliners;by number of vessels and gross registered tonnage; 1985-95.

| Year | 100-200GRT | | 200-500GRT | | 500-1000GRT | | Total | |
|---|---|---|---|---|---|---|---|---|
| | No | GRT | No | GRT | No | GRT | No | GRT |
| 1985 | -- | -- | 40 | 16,800 | 17 | 12,584 | 57 | 29,384 |
| 1986 | -- | -- | 12 | 4,795 | 24 | 17,440 | 36 | 22,235 |
| 1987 | -- | -- | 13 | 4,933 | 39 | 30,049 | 52 | 34,982 |
| 1988 | 1 | 149 | 12 | 4,928 | 53 | 39,464 | 66 | 44,541 |
| 1989 | -- | -- | 18 | 8,013 | 70 | 50,446 | 88 | 58,459 |
| 1990 | -- | -- | 20 | 9,599 | 57 | 40,503 | 77 | 50,102 |
| 1991 | -- | -- | 4 | 1,987 | 5 | 3,076 | 9 | 5,063 |
| 1992 | 1 | 149 | 1 | 497 | -- | -- | 2 | 646 |
| 1993 | -- | -- | 10 | 4,657 | 4 | 2,741 | 14 | 7,398 |
| 1994 | -- | -- | 6 | 2,926 | 5 | 3,506 | 11 | 6,432 |
| 1995 | -- | -- | -- | -- | -- | -- | 0 | 0 |

Source: *Fisheries Yearbook Taiwan Area,* Taiwan Fisheries Bureau.

Appendix 6. Taiwan. Newly built harpoon vessels;by number of vessels and gross registered tonnage; 1985-95.

| Year | Number of Vessels | Total Capacity (GRT) |
|---|---|---|
| 1985 | 20 | 310 |
| 1986 | 18 | 463 |
| 1987 | 8 | 115 |
| 1988 | 1 | 13 |
| 1989 | -- | -- |
| 1990 | 1 | 54 |
| 1991 | -- | -- |
| 1992 | -- | -- |
| 1993 | -- | -- |
| 1994 | 3 | 64 |
| 1995 | -- | -- |

Source: *Fisheries Yearbook Taiwan Area,* Taiwnn Fisheries Bureau.

Appendix 7. Taiwan. Total fisheries catch, by type of fishery, 1980, 1985-95.

| Type of Fishery | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Metric tons* | | | | | | |
| **Marine Fisheries** | | | | | | | | | | | | |
| Distant-water | 370,342 | 441,747 | 497,403 | 596,969 | 731,700 | 734,459 | 766,985 | 714,263 | 740,195 | 834,965 | 683,780 | 709,543 |
| Off-shore | 350,987 | 288,363 | 272,152 | 277,613 | 275,680 | 333,798 | 292,391 | 266,945 | 280,513 | 258,601 | 242,272 | 255,981 |
| Coastal | 37,296 | 54,467 | 56,737 | 53,905 | 49,089 | 49,794 | 48,362 | 41,231 | 45,399 | 43,443 | 39,800 | 43,518 |
| Mariculture | 29,988 | 36,067 | 28,266 | 29,520 | 34,617 | 37,074 | 36,507 | 31,192 | 33,958 | 35,105 | 33,185 | 33,230 |
| Sub-total | 788,613 | 820,644 | 854,558 | 958,007 | 1,091,086 | 1,155,125 | 1,144,425 | 1,053,631 | 1,100,065 | 1,172,114 | 999,037 | 1,042,272 |
| **Freshwater Fisheries** | | | | | | | | | | | | |
| Wild catch | 2,701 | 2,409 | 2,183 | 2,255 | 3,424 | 3,877 | 3,494 | 2,327 | 1,782 | 1,688 | 1,456 | 1,211 |
| Freshwater culture | 145,020 | 214,668 | 237,846 | 275,908 | 266,357 | 212,681 | 307,756 | 260,693 | 227,690 | 250,170 | 254,780 | 253,404 |
| Sub-total | 147,721 | 217,077 | 240,029 | 278,163 | 269,781 | 216,558 | 311,250 | 263,020 | 229,472 | 251,858 | 256,236 | 254,615 |
| **Grand Total** | 936,334 | 1,037,721 | 1,094,587 | 1,236,170 | 1,360,868 | 1,371,681 | 1,455,495 | 1,316,651 | 1,329,536 | 1,423,972 | 1,255,273 | 1,296,887 |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau.

Appendix 8. Taiwan. Total fisheries catch, by type of fishery, 1980, 1985-95.

| Type of Fishery | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Metric tons* | | | | | | |
| **Distant-water** | | | | | | | | | | | | |
| Longliner | 83,669 | 119,232 | 151,233 | 146,414 | 147,615 | 139,113 | 155,921 | 134,574 | 237,132 | 300,193 | 209,319 | 223,441 |
| Purse Seine | 19,918 | 50,380 | 52,011 | 55,683 | 114,617 | 117,164 | 124,599 | 107,062 | 165,879 | 176,666 | 182,555 | 186,815 |
| Driftnet | -- | 55,512 | 46,282 | 67,930 | 62,146 | 75,328 | 125,112 | 90,982 | 25,551 | -- | -- | -- |
| Total Distant-water | 103,587 | 225,124 | 249,526 | 270,027 | 324,378 | 331,605 | 405,632 | 332,618 | 428,562 | 476,859 | 391,874 | 410,256 |
| **Offshore** | | | | | | | | | | | | |
| Longline (Tuna) | 30,799 | 26,502 | 20,239 | 34,110 | 34,523 | 30,151 | 21,292 | 23,960 | 29,043 | 27,287 | 22,698 | 32,691 |
| Gillnet | 19,281 | 18,643 | 21,167 | 19,314 | 23,827 | 28,785 | 22,307 | 19,921 | 17,476 | 12,224 | 17,275 | 16,624 |
| Longline (misc) | 17,224 | 22,341 | 19,667 | 19,235 | 19,072 | 11,955 | 13,847 | 12,957 | 16,993 | 13,588 | 14,936 | 11,875 |
| Troll Line | 3,972 | 5,016 | 2,571 | 1,817 | 1,859 | 1,547 | 3,945 | 3,699 | 2,288 | 5,112 | 3,353 | 336 |
| Other | 1,136 | 562 | 1,271 | 1,099 | 992 | 766 | 1,821 | 812 | 1,245 | 1,542 | 3,485 | 4,690 |
| Total Offshore | 72,412 | 73,064 | 64,915 | 75,575 | 80,273 | 73,204 | 63,212 | 61,349 | 67,045 | 59,753 | 61,747 | 66,216 |
| **Coastal** | | | | | | | | | | | | |
| Set-net | 3,716 | 8,094 | 9,403 | 11,185 | 11,051 | 8,108 | 7,026 | 8,311 | 10,537 | 12,008 | 13,143 | 11,580 |
| Gillnet | 10,590 | 16,920 | 16,906 | 16,964 | 16,023 | 17,550 | 17,472 | 14,183 | 15,405 | 17,264 | 14,387 | 13,889 |
| Harpoon | 7,220 | 5,385 | 4,327 | 2,887 | 2,563 | 1,939 | 1,862 | 2,151 | 1,894 | 1,238 | 1,355 | 1,293 |
| Other | 6,090 | 10,297 | 12,270 | 11,092 | 9,625 | 3,515 | 3,486 | 3,358 | 5,228 | 4,882 | 3,385 | 5,669 |
| Total Coastal | 27,616 | 40,696 | 42,906 | 42,128 | 39,262 | 31,112 | 29,846 | 28,003 | 33,064 | 35,392 | 32,270 | 32,431 |
| **Grand Total** | 203,615 | 338,884 | 357,347 | 387,730 | 443,913 | 435,921 | 498,690 | 421,970 | 528,671 | 572,004 | 485,891 | 508,903 |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau.

Appendix 9. Taiwan. Total swordfish catch, by type of fishery, 1980, 1985-95.

| Type of Fishery | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Metric tons* | | | | | | |
| **Distant-water** | | | | | | | | | | | | |
| Longliner | 1,518 | 1,507 | 2,312 | 2,017 | 2,585 | 2,714 | 3,916 | 2,931 | 2,878 | 5,977 | 8,432 | 19,973 |
| Purse Seine | -- | 186 | 29 | 54 | 599 | 760 | 909 | 513 | 440 | -- | -- | -- |
| Driftnet | -- | 234 | 114 | 168 | 703 | 1,013 | 1,182 | 620 | 143 | -- | -- | -- |
| Total Distant-water | 1,518 | 1,929 | 2,455 | 2,239 | 3,887 | 4,487 | 6,006 | 4,063 | 3,461 | 5,977 | 8,432 | 19,973 |
| **Offshore** | | | | | | | | | | | | |
| Longline (Tuna) | 603 | 566 | 456 | 1,328 | 777 | 1,390 | 462 | 366 | 666 | 568 | 559 | 657 |
| Gillnet | 4 | 29 | 1 | -- | -- | 2 | 2 | 2 | 1 | 3 | 3 | 2 |
| Longline (misc) | -- | -- | 6 | -- | 183 | 7 | 7 | 1 | -- | -- | -- | -- |
| Troll Line | 1 | 21 | -- | -- | -- | 10 | 68 | 39 | 19 | -- | -- | -- |
| Other | -- | -- | -- | -- | -- | 17 | 13 | 16 | 14 | 9 | 9 | -- |
| Total Offshore | 608 | 616 | 463 | 1,328 | 960 | 1,427 | 552 | 424 | 700 | 580 | 571 | 659 |
| **Coastal** | | | | | | | | | | | | |
| Set-net | -- | 3 | 3 | -- | -- | 3 | 4 | 4 | 12 | 13 | 12 | 6 |
| Gillnet | -- | -- | -- | -- | 1 | -- | -- | -- | -- | -- | -- | -- |
| Harpoon | 72 | 166 | 201 | 187 | 80 | 61 | 118 | 205 | 287 | 194 | 211 | 14 |
| Other | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Coastal | 72 | 169 | 204 | 187 | 81 | 64 | 122 | 209 | 299 | 207 | 223 | 20 |
| **Grand Total** | 2,197 | 2,712 | 3,122 | 3,754 | 4,928 | 5,977 | 6,681 | 4,696 | 4,459 | 6,764 | 9,225 | 20,052 |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau.

Appendix 10. Taiwan. Total catch of billfish species, by species and quantity, 1980, 1985-95.

| Year | Swordfish | Striped Marlin | Blue Marlin | Black Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | | |
| 1980 | 2,676 | 3,076 | 5,106 | 2,465 | 4,326 | 17,649 | 15% |
| 1985 | 2,714 | 3,433 | 4,245 | 2,828 | 2,386 | 15,606 | 17% |
| 1986 | 3,122 | 3,954 | 5,132 | 2,837 | 3,348 | 18,393 | 17% |
| 1987 | 3,754 | 4,252 | 8,635 | 2,305 | 3,011 | 21,957 | 17% |
| 1988 | 4,928 | 4,279 | 8,553 | 3,799 | 3,027 | 24,586 | 20% |
| 1989 | 5,977 | 4,360 | 8,002 | 2,727 | 4,083 | 25,149 | 24% |
| 1990 | 6,681 | 4,287 | 10,435 | 4,991 | 4,535 | 30,929 | 22% |
| 1991 | 4,696 | 3,803 | 10,289 | 5,467 | 3,921 | 28,176 | 17% |
| 1992 | 4,459 | 3,960 | 10,434 | 3,594 | 4,885 | 27,332 | 16% |
| 1993 | 6,764 | 4,592 | 11,750 | 2,202 | 4,405 | 29,713 | 23% |
| 1994 | 9,225 | 4,324 | 8,432 | 2,091 | 2,786 | 26,858 | 34% |
| 1995 | 20,051 | 3,897 | 10,986 | 1,420 | 2,226 | 38,580 | 52% |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau.

Appendix 11. Taiwan. Swordfish catch, by major FAO fishing area, 1980, 1985-95.

| FAO Area | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| | *Metric tons* | | | | | | | | | | | |
| Pacific Ocean | | | | | | | | | | | | |
| Area 71 | 70 | 92F | 87F | 100F | 110F | 200F | 230F | 67F | 80F | 94F | 200F | 522 |
| Area 61 | 1,158F | 1,179F | 1,120F | 474F | 356F | 2,118F | 2,457F | 61F | 500F | 972F | 2,300F | 6,024 |
| Area 77 | 117F | 137F | 130F | 150F | 160F | 400F | 460F | 40F | 180F | 210F | 330F | 870 |
| Area 81 | 114F | 21F | 20F | 20F | 20F | 92F | 100F | 40F | 40F | 51F | 112F | 296 |
| Area 67 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Area 87 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Pacific | 1,459 | 1,429 | 1,357 | 744 | 646 | 2,810 | 3,247 | 208 | 800 | 1,327 | 2,942 | 7,712 |
| Indian Ocean | | | | | | | | | | | | |
| Area 51 | 157 | 309 | 806 | 1,516 | 2,426 | 1,396 | 1,988 | 2,636 | 3,773 | 3,960F | 3,431F | 8,984 |
| Area 57 | 353 | 529 | 662 | 994 | 1,177 | 1,289 | 545 | 441 | 679 | 728F | 271F | 714 |
| Total Indian | 510 | 838 | 1,468 | 2,510 | 3,603 | 2,685 | 2,533 | 3,077 | 4,452 | 4,688 | 3,702 | 9,698 |
| Atlantic Ocean | | | | | | | | | | | | |
| Area 21 | -- | 37 | 22 | 2 | 3F | 3F | -- | -- | -- | -- | -- | -- |
| Area 27 | -- | 15 | 18 | 13 | 21F | 21F | -- | -- | -- | -- | -- | -- |
| Area 31 | 53F | 83 | 69 | 57 | 10F | 10F | 168F | 400F | 100F | 80F | 350F | 350 |
| Area 34 | 44F | 18 | 13 | 13 | 8F | 3F | 40F | 174 | 32F | 18F | 80F | 79 |
| Area 37 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Area 41 | 259F | 81 | 59 | 169 | 400F | 300F | 543F | 667F | 1,071F | 551F | 1,860F | 1,900 |
| Area 47 | 250F | 98 | 106 | 46 | 214F | 169F | 150F | 170F | 200F | 100F | 291F | 312 |
| Total Atlantic | 606 | 332 | 287 | 300 | 656 | 506 | 901 | 1,411 | 1,403 | 749 | 2,581 | 2,641 |
| Grand Total | 2,575 | 2,599 | 3,112 | 3,554 | 4,905 | 6,001 | 6,681 | 4,696 | 6,655 | 6,764 | 9,225 | 20,051 |

F=FAO estimate from available sources of information or calculation based on specific assumptions.
Source: United Nations Food and Agriculture Organization, *Yearbook of Fishery Statistics, Volume 78.*

Appendix 12. Taiwan. Distant-water swordfish catch, by ocean, 1989-95.*

| Ocean | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| | *Metric tons* | | | | | | |
| **Driftnet** | | | | | | | |
| North Pacific | 58 | -- | -- | -- | -- | -- | -- |
| South Pacific | -- | -- | -- | -- | -- | -- | -- |
| Indian | 490 | 78 | -- | -- | -- | -- | -- |
| Other | 465 | 1,104 | 620 | 143 | -- | -- | -- |
| Driftnet Total | 1,013 | 1,182 | 620 | 143 | 0 | 0 | 0 |
| **Purse Seiner** | | | | | | | |
| Pacific | 444 | 909 | 513 | 440 | -- | -- | -- |
| Indian | 316 | -- | -- | -- | -- | -- | -- |
| Purse Seiner Total | 760 | 909 | 513 | 440 | 0 | 0 | 0 |
| **Longliner** | | | | | | | |
| Pacific | 177 | 783 | 869 | 598 | 514 | 606 | NA |
| Atlantic | 482 | 762 | 656 | 803 | 755 | 3,056 | NA |
| Indian | 1,301 | 591 | 401 | 960 | 3,459 | 3,702 | NA |
| Other | 754 | 1,780 | 1,004 | 517 | 1,248 | 1,068 | NA |
| Longliner Total | 2,714 | 3,916 | 2,931 | 2,878 | 5,977 | 8,432 | NA |
| **Grand Total** | 4,487 | 6,006 | 4,063 | 3,461 | 5,977 | 8,432 | NA |

*--Data prior to 1989 and after 1994 not available.
Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau.

Appendix 13. Taiwan. Distant-water longliner catch of billfish species, by species and quantity, 1980, 1985-95.

| Year | Swordfish | Striped Marlin | Blue Marlin | Black Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | | |
| 1980 | 1,518 | 1,855 | 925 | 474 | 151 | 4,923 | 31% |
| 1985 | 1,507 | 2,272 | 1,131 | 886 | 457 | 6,253 | 24% |
| 1986 | 2,312 | 3,422 | 2,046 | 1,178 | 1,237 | 10,195 | 23% |
| 1987 | 2,017 | 3,433 | 2,446 | 1,000 | 1,150 | 10,046 | 20% |
| 1988 | 2,585 | 2,882 | 2,721 | 1,143 | 836 | 10,167 | 25% |
| 1989 | 2,714 | 2,482 | 2,543 | 918 | 1,346 | 10,003 | 27% |
| 1990 | 3,916 | 2,552 | 5,776 | 2,121 | 1,546 | 15,911 | 25% |
| 1991 | 2,931 | 2,142 | 5,450 | 2,396 | 1,094 | 14,013 | 21% |
| 1992 | 2,878 | 2,312 | 4,553 | 692 | 612 | 11,047 | 26% |
| 1993 | 5,977 | 4,229 | 7,307 | 1,424 | 3,524 | 22,461 | 27% |
| 1994 | 8,432 | 3,992 | 5,169 | 925 | 1,474 | 19,992 | 42% |
| 1995 | 19,373 | 3,732 | 6,214 | 912 | 1,554 | 31,785 | 61% |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau

Appendix 14. Taiwan. Catch of tuna and billfish by distant-water longliners, by species and quantity, 1989-94.

| Species | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| | | | *Metric tons* | | | |
| **Pacific Ocean** | | | | | | |
| Albacore | 12,230 | 9,689 | 15,205 | 30,404 | 20,974 | 22,099 |
| Bigeye | 539 | 1,438 | 4,731 | 15,013 | 2,235 | 3,265 |
| Bluefin | 70 | 9 | 117 | 290 | 56 | 95 |
| Other Tuna | 42 | 2,086 | 2,716 | 1,501 | 1,518 | 1,141 |
| Yellowfin | 1,270 | 5,411 | 6,508 | 31,792 | 6,986 | 7,307 |
| Swordfish | 177 | 783 | 869 | 598 | 514 | 606 |
| Striped Marlin | 165 | 381 | 530 | 489 | 348 | 480 |
| Blue Marlin | 473 | 3,086 | 3,164 | 2,808 | 3,100 | 2,241 |
| Black Marlin | 86 | 541 | 833 | 457 | 396 | 277 |
| Sailfish | 164 | 86 | 231 | 201 | 82 | 149 |
| Others | 2,280 | 1,776 | 3,014 | 3,244 | 3,964 | 26 |
| Grand Total | 17,496 | 25,256 | 37,918 | 86,797 | 40,173 | 37,686 |

Source: *Fisheries Yearbook-Taiwan Area*, Taiwan Fisheries Bureau

Appendix 15. Taiwan. Catch of tuna and billfish by longliners and gillnetters, by species and quantity, 1989-94.

| Species | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| | *Metric tons* | | | | | |
| **Indian Ocean** | | | | | | |
| Albacore | 21,454 | 26,898 | 22,103 | 12,425 | 11,889 | 14,407 |
| Bigeye | 15,328 | 17,466 | 17,934 | 16,383 | 34,205 | 23,990 |
| Southern bluefin | 180 | 177 | 34 | 82 | 621 | 787 |
| Yellowfin | 15,258 | 12,487 | 9,716 | 21,142 | 75,818 | 29,271 |
| Skipjack | 96 | 103 | 34 | 76 | 220 | 14 |
| Swordfish | 2,685 | 2,535 | 3,077 | 5,842 | --* | 3,702 |
| Blue Marlin | 1,263 | 773 | 936 | 1,782 | 2,109 | 262 |
| Black Marlin | 367 | 175 | 203 | 604 | 158 | 52 |
| Striped Marlin | 1,403 | 593 | 1,216 | 1,103 | 3,074 | 1,828 |
| Others | 969 | 214 | 1,150 | 630 | 828 | 344 |
| Grand Total | 59,003 | 61,421 | 56,403 | 60,069 | 128,922 | 74,567 |

Source: 1989-93--Indo-Pacific Tuna Programme; 1994-Taiwan Fisheries Yearbook
*—Taiwan Fisheries Yearbook puts this figure at 3,459 metric tons.

Appendix 16. Taiwan. Distant-water longliner catch of billfish species in the western Indian Ocean (FAO area 51), by species and quantity, 1980, 1985-93.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Other | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|---|
| *Metric tons* | | | | | | | | |
| 1980 | 196 | 37 | 266 | -- | 245 | 31 | 775 | 32% |
| 1985 | 316 | 71 | 288 | -- | 476 | 8 | 1,159 | 41% |
| 1986 | 1,677 | 240 | 1,532 | -- | 1,241 | 86 | 4,776 | 26% |
| 1987 | 1,635 | 337 | 1,334 | -- | 1,514 | 117 | 4,937 | 31% |
| 1988 | 1,340 | 262 | 1,287 | -- | 2,402 | 112 | 5,403 | 44% |
| 1989 | 711 | 134 | 818 | -- | 1,361 | 935 | 3,959 | 34% |
| 1990 | 573 | 120 | 491 | -- | 1,873 | 159 | 3,216 | 58% |
| 1991 | 761 | 148 | 975 | -- | 2,621 | 949 | 5,454 | 48% |
| 1992 | 1,401 | 570 | 889 | -- | 5,161 | 390 | 8,411 | 61% |
| 1993 | 1,665 | 149 | 2,484 | -- | NA | 513 | 4,811 | NA |

Source: Indo-Pacific Tuna Development and Management Programme, *Indian Ocean and Southeast Asian Tuna Fisheries Data Summary for 1993.*

Appendix 17. Taiwan. Distant-water longliners catch of billfish species in the eastern Indian Ocean (FAO area 57), by species and quantity, 1980, 1985-93.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Other | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|---|
| *Metric tons* | | | | | | | | |
| 1980 | 687 | 246 | 2245 | -- | 571 | 75 | 3,824 | 15% |
| 1985 | 1015 | 337 | 1676 | -- | 815 | 74 | 3,917 | 21% |
| 1986 | 675 | 253 | 1552 | -- | 739 | 37 | 3,256 | 23% |
| 1987 | 678 | 283 | 1417 | -- | 933 | 59 | 3,370 | 28% |
| 1988 | 485 | 214 | 590 | -- | 927 | 40 | 2,256 | 41% |
| 1989 | 533 | 233 | 578 | -- | 1203 | 29 | 2,576 | 47% |
| 1990 | 185 | 55 | 94 | -- | 557 | 52 | 943 | 59% |
| 1991 | 126 | 55 | 222 | -- | 413 | 159 | 975 | 42% |
| 1992 | 374 | 34 | 211 | -- | 675 | 240 | 1,534 | 44% |
| 1993 | 444 | 9 | 590 | 315 | NA | -- | 1,358 | NA |

Source: Indo-Pacific Tuna Development and Management Programme, *Indian Ocean and Southeast Asian Tuna Fisheries Data Summary for 1993.*

Appendix 18. Taiwan. Catch of tuna and billfish by longliners, by species and quantity, 1989-94.

| Species | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994* |
| | *Metric tons* | | | | | |
| **Atlantic Ocean** | | | | | | |
| Albacore | 19,680 | 24,374 | 21,900 | 23,200 | 25,700 | 28,888 |
| Bigeye | 717 | 4,910 | 766 | 4,749 | 11,881 | 19,479 |
| Bluefin | -- | -- | -- | -- | 334 | 724 |
| Southern bluefin | 69 | 55 | 13 | -- | 407 | 238 |
| Yellowfin | 599 | 3,014 | 1,274 | 1,748 | 3,713 | 6,260 |
| Skipjack | 22 | -- | 35 | -- | 11 | 6 |
| Swordfish | 482 | 901 | 1,411 | 1,403 | 749 | 2,582 |
| Billfish | 1,452 | 1,130 | 1,690 | 1,286 | 1,943 | 1,517 |
| Others | 1,075 | 223 | 2,023 | -- | 202 | -- |
| Grand Total | 24,096 | 34,607 | 29,112 | 32,386 | 44,940 | 59,694 |

Source: ICCAT Statistical Bulletin, Vol. 25-1994.

Appendix 19. Taiwan. Distant-water longliner catch of swordfish and billfish in the Atlantic and Mediterranean Oceans , by species and quantity, 1980, 1985-94.

| Year | Swordfish | Billfish | Total | Swordfish as % of Total |
|---|---|---|---|---|
| | *Metric tons* | | | |
| 1980 | 643 | 588 | 1,231 | 52% |
| 1985 | 332 | 463 | 795 | 42% |
| 1986 | 287 | 779 | 1,066 | 27% |
| 1987 | 300 | 1,102 | 1,402 | 21% |
| 1988 | 632 | 1,038 | 1,670 | 38% |
| 1989 | 482 | 1,452 | 1,934 | 25% |
| 1990 | 901 | 1,130 | 2,031 | 44% |
| 1991 | 1,411 | 1,690 | 3,101 | 46% |
| 1992 | 1,403 | 1,286 | 2,689 | 52% |
| 1993 | 749 | 1,943 | 2,692 | 28% |
| 1994 | 2,582 | 1,517 | 4,099 | 63% |

Source: International Commission for the Conservation of Atlantic Tunas, *Statistical Bulletin*.

Appendix 20. Taiwan. Distant-water driftnet catch of billfish species, by species and quantity, 1980, 1985-92.

| Year | Swordfish | Striped Marlin | Blue Marlin | Black Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | | |
| 1980 | -- | -- | -- | -- | -- | -- | -- |
| 1985 | 234 | 280 | 576 | 596 | 200 | 1,886 | 12% |
| 1986 | 114 | 167 | 261 | 238 | 223 | 1,003 | 11% |
| 1987 | 168 | 219 | 439 | 254 | 269 | 1,349 | 12% |
| 1988 | 703 | 410 | 923 | 518 | 315 | 2,869 | 25% |
| 1989 | 1,013 | 842 | 1,172 | 530 | 726 | 4,283 | 24% |
| 1990 | 1,182 | 739 | 1,276 | 924 | 799 | 4,920 | 24% |
| 1991 | 620 | 614 | 1,172 | 954 | 476 | 3,836 | 16% |
| 1992 | 143 | 302 | 369 | 326 | 654 | 1,794 | 8% |

Note: This fishery ceased in 1993 with the advent of the U.N. moratorium on high-seas pelagic driftnet fishing.
Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau

Appendix 21. Taiwan. Driftnet catch of billfish species in FAO Area 51 (Western Indian Ocean), 1980, 1985-92.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Other | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|---|
| *Metric tons* | | | | | | | | |
| 1980 | -- | -- | -- | -- | -- | -- | -- | -- |
| 1985 | -- | -- | -- | -- | -- | -- | -- | -- |
| 1986 | -- | -- | 7 | -- | -- | -- | 7 | 0% |
| 1987 | 583 | -- | 32 | -- | 2 | -- | 617 | 0% |
| 1988 | 3 | -- | 1 | -- | 24 | -- | 28 | 86% |
| 1989 | 17 | -- | 3 | -- | 35 | 5 | 60 | 58% |
| 1990 | 15 | -- | 8 | -- | 51 | 2 | 76 | 67% |
| 1991 | 49 | -- | 19 | -- | 15 | -- | 83 | 18% |
| 1992 | 7 | -- | 3 | -- | 2 | -- | 12 | 17% |

Note: This fishery ceased in 1993 with the advent of the U.N. moratorium on high-seas pelagic driftnet fishing.
Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 22. Taiwan. Driftnet catch of billfish species in FAO Area 57 (Eastern Indian Ocean), 1980, 1985-92.

| Year | Blue Marlin | Black Marlin | Striped Marlin | Sailfish | Swordfish | Other | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|---|
| *Metric tons* | | | | | | | | |
| 1980 | -- | -- | -- | -- | -- | -- | -- | -- |
| 1985 | -- | -- | -- | -- | -- | -- | -- | -- |
| 1986 | -- | -- | 1 | 11 | 182 | -- | 194 | 94% |
| 1987 | 24 | -- | 1 | -- | 61 | -- | 86 | 71% |
| 1988 | 21 | 3 | 10 | -- | 250 | 1 | 285 | 88% |
| 1989 | 2 | -- | 4 | -- | 86 | -- | 92 | 93% |
| 1990 | -- | -- | -- | -- | 54 | 1 | 55 | 98% |
| 1991 | -- | -- | -- | -- | 28 | -- | 28 | 100% |
| 1992 | -- | -- | -- | -- | 4 | -- | 4 | 100% |

Note: This fishery ceased in 1993 with the advent of the U.N. moratorium on high-seas pelagic driftnet fishing.
Source: *Indian Ocean Tuna Fisheries Data Summary, 1983-93*, Indo-Pacific Tuna Development and Management Programme.

Appendix 23. Taiwan. Offshore longliner catch of billfish species, by species and quantity, 1980, 1985-94.

| Year | Swordfish | Striped Marlin | Blue Marlin | Black Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | | |
| 1980 | 603 | 223 | 1,134 | 530 | 1,897 | 4,387 | 14% |
| 1985 | 566 | 513 | 1,187 | 298 | 299 | 2,863 | 20% |
| 1986 | 456 | 179 | 1,723 | 525 | 293 | 3,176 | 14% |
| 1987 | 1,328 | 383 | 4,617 | 470 | 729 | 7,527 | 18% |
| 1988 | 777 | 457 | 2,822 | 856 | 506 | 5,418 | 14% |
| 1989 | 1,390 | 184 | 2,644 | 306 | 477 | 5,001 | 28% |
| 1990 | 462 | 137 | 1,730 | 286 | 608 | 3,223 | 14% |
| 1991 | 366 | 254 | 2,152 | 651 | 585 | 4,008 | 9% |
| 1992 | 666 | 219 | 3,769 | 684 | 822 | 6,160 | 11% |
| 1993 | 568 | 221 | 3,876 | 248 | 242 | 5,155 | 11% |
| 1994 | 559 | 138 | 3,013 | 444 | 481 | 4,635 | 12% |
| 1995 | 657 | 83 | 3,820 | 209 | 292 | 5,061 | 13% |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau

Appendix 24. Taiwan. Coastal harpoon catch of billfish species, by species and quantity, 1980, 1985-95.

| Year | Swordfish | Striped Marlin | Blue Marliin | Black Marlin | Sailfish | Total | Swordfish as % of Total |
|---|---|---|---|---|---|---|---|
| | | | *Metric tons* | | | | |
| 1980 | 72 | 92 | 444 | 408 | 375 | 1,391 | 5% |
| 1985 | 166 | 152 | 747 | 511 | 887 | 2,463 | 7% |
| 1986 | 201 | 119 | 839 | 563 | 841 | 2,563 | 8% |
| 1987 | 187 | 132 | 973 | 455 | 219 | 1,966 | 10% |
| 1988 | 80 | 70 | 658 | 504 | 268 | 1,580 | 5% |
| 1989 | 61 | 124 | 640 | 453 | 278 | 1,556 | 4% |
| 1990 | 118 | 207 | 427 | 560 | 304 | 1,616 | 7% |
| 1991 | 205 | 173 | 338 | 414 | 877 | 2,007 | 10% |
| 1992 | 287 | 163 | 432 | 481 | 165 | 1,528 | 19% |
| 1993 | 194 | 132 | 400 | 297 | 116 | 1,139 | 17% |
| 1994 | 211 | 176 | 206 | 531 | 128 | 1,252 | 17% |
| 1995 | 14 | 67 | 895 | 197 | 22 | 1,195 | 1% |

Source: *Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau

Appendix 25. Taiwan. Overseas landings of swordfish in metric tons, by port, 1989-94.*

| Landing Port | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| **Pacific Ocean** | | | | | | |
| Samoa | 52 | 73 | 62 | 63 | 72 | 124 |
| Fiji | 27 | 27 | 30 | 26 | 21 | 77 |
| Shimizu (Pacific Ocean Transship) | -- | -- | 13 | 5 | -- | 12 |
| Guam | 3 | -- | -- | 22 | -- | -- |
| Hawaii | NA | 9 | -- | -- | -- | -- |
| Kurihama | -- | -- | 2 | -- | -- | -- |
| Montevideo (Pacific Ocean Transship) | -- | -- | -- | -- | 5 | -- |
| Other | -- | -- | -- | -- | 28 | 32 |
| **Pacific Ocean Total** | 83 | 109 | 107 | 116 | 127 | 245 |
| **Indian Ocean** | | | | | | |
| Singapore | 190 | 199 | 113 | 191 | 117 | 789 |
| Port Louis | 129 | 147 | 205 | 678 | 570 | 1,019 |
| Reunion | 54 | 36 | 38 | 34 | 129 | 284 |
| Durban | -- | -- | -- | -- | 99 | 16 |
| Singapore Transship | 244 | 193 | 29 | -- | -- | -- |
| Port Louis Transship | 43 | 8 | -- | -- | -- | -- |
| Reunion Transship | -- | 8 | -- | -- | -- | -- |
| Shimizu (Indian Ocean Transship) | -- | -- | -- | 47 | 608 | 535 |
| Kurihama (Indian Ocean Transship) | -- | -- | -- | 9 | 82 | 1 |
| Other Indian Ocean | -- | -- | -- | -- | 1,854 | 1,058 |
| Indian Ocean Transship (At-sea) | 95 | 78 | 16 | -- | -- | -- |
| **Indian Ocean Total** | 755 | 669 | 402 | 960 | 3,459 | 3,702 |
| **Atlantic Ocean** | | | | | | |
| Las Palmas | 49 | 59 | 62 | 12 | -- | 113 |
| Saint Martin | 40 | 45 | 50 | 64 | 46 | 59 |
| Cape Town | 132 | 399 | 414 | 447 | 28 | 631 |
| Montevideo | 219 | 72 | 105 | 144 | 99 | 239 |
| Port of Spain | 31 | 190 | 26 | 119 | 190 | 369 |
| Brazil | -- | -- | -- | -- | 210 | 463 |
| Cape Town Transship | 10 | -- | -- | -- | -- | -- |
| North Atlantic | NA | 1 | -- | -- | -- | -- |
| Shimizu (Atlantic Ocean Transship) | -- | -- | -- | 18 | 17 | 718 |
| Other Atlantic Ocean | -- | -- | -- | -- | 166 | 464 |
| **Atlantic Ocean Total** | 482 | 768 | 656 | 803 | 755 | 3,056 |
| **Grand Total** | 1,320 | 1,545 | 1,165 | 1,878 | 4,342 | 7,003 |

*---Data not available prior to 1989.Source:*Fisheries Yearbook Taiwan Area*, Taiwan Fisheries Bureau.

Appendix 26. Taiwan. Tuna Fishing Companies and Associations.

**FCF Fishery Co Ltd**
28th Fl, No. 8, Min Chuan
2nd Road, Chien Chen District
Kaohsiung, TAIWAN
TEL 886-7-339-1636-50
FAX 886-7-330-5611-3

**Taiwan Ming Tai Co Ltd**
No. 10 Lane 101 Ta-An Road Sec 1
Taipei, TAIWAN
TEL 886-2-731-5215
FAX 886-2-731-5348

**Unifishery Enterprise Co Ltd**
2nd Floor, No. 296, Ming Sheng 1st Road
Kaohsiung, TAIWAN
TEL 886-7-211-6579
FAX 886-7-211-3963

**Taiwan Deep Sea Boatowners & Exporters Association**
Room 409, No.3 Fishing Harbor East
2nd Road Chien Chen District
Kaohsiung, TAIWAN
TEL 886-7-841-9606
FAX 886-7-831-3304

**Kaohsiung Fishermen Association**
No. 3 Fishing Harbor East
2nd Road Chien
Kaohsiung, TAIWAN
TEL 886-7-311-7445
FAX 886-7-831-3439

Appendix 27. Taiwan. Supply and mean price of swordfish at major fish markets, 1989-95.

| Year | Kaohsiung | | Tungkang | |
|---|---|---|---|---|
| | Quantity | Price | Quantity | Price |
| | *Metric tons/U.S. Dollars per kilogram* | | | |
| 1989 | 1,225 | 1.74 | 37 | 3.00 |
| 1990 | 1,333 | 1.86 | 669 | 2.39 |
| 1991 | 874 | 3.38 | 609 | 3.16 |
| 1992 | 522 | 2.32 | 982 | 2.81 |
| 1993 | 639 | 1.28 | 801 | 2.21 |
| 1994 | 828 | 1.3 | 686 | 2.53 |
| 1995 | 566 | 1.38 | 924 | 2.23 |

Source: Taiwan Fisheries Bureau.

Appendix 28. Taiwan. Exports of swordfish to the United States, 1980, 1985-95.

| Year | Fresh Swordfish | | Frozen Swordfish | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| | *Metric tons/U.S. Dollars (thousands)* | | | |
| 1980 | – | – | 9 | 17 |
| 1985 | 1,204 | 4,128 | 232 | 715 |
| 1986 | 1,393 | 5,437 | 117 | 390 |
| 1987 | 761 | 3,552 | 49 | 254 |
| 1988 | 172 | 728 | 65 | 347 |
| 1989 | 65 | 243 | 299 | 1,525 |
| 1990 | 26 | 127 | 203 | 1,045 |
| 1991 | 51 | 331 | 37 | 233 |
| 1992 | 112 | 734 | 2 | 8 |
| 1993 | 9 | 67 | 198 | 962 |
| 1994 | 8 | 34 | 239 | 1,063 |
| 1995 | 6 | 37 | 57 | 245 |

Source: U.S. Customs Department

Appendix 29. Taiwan. Exports of frozen tunas and billfish to Japan, 1984-94

| Species | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| | *Metric tons* | | | | | | | | | | |
| Yellowfin tuna | 4,600 | 7,729 | 10,557 | 20,687 | 22,705 | 20,994 | 37,250 | 31,667 | 57,742 | 93,701 | 56,624 |
| Bigeye tuna | 11,364 | 11,725 | 14,154 | 16,118 | 17,586 | 18,977 | 23,990 | 38,042 | 30,171 | 27,482 | 35,298 |
| Bluefin tuna | 211 | 100 | 61 | 146 | 243 | 889 | 714 | 1,157 | 218 | 257 | 228 |
| Other tunas | 6 | – | 146 | 1 | – | 1 | – | 12 | 910 | – | – |
| Marlins and Sailfish | 3,038 | 3,608 | 5,741 | 5,033 | 3,550 | 4,220 | 5,060 | 4,887 | 7,364 | 7,345 | 6,302 |
| Southern Bluefin Tuna | – | – | – | – | – | – | – | – | – | 536 | 883 |
| Total | 19,219 | 23,162 | 30,659 | 41,985 | 44,084 | 45,081 | 67,014 | 75,765 | 96,405 | 129,321 | 99,335 |

Source: Taiwan Deep Sea Tuna Boat Owners and Exporters Association.